

In This Issue—Analysis of North East Generator on Dodge Brothers Car

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# MOTOR AGE

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Number 22

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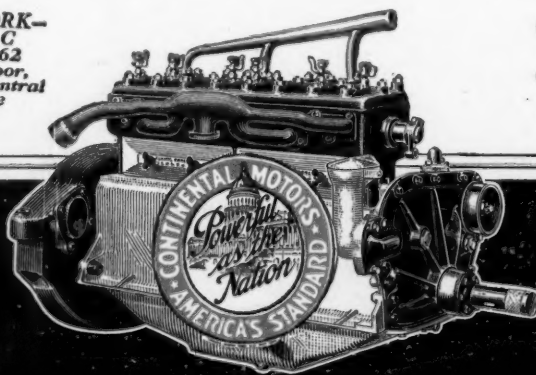
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# MOTOR AGE

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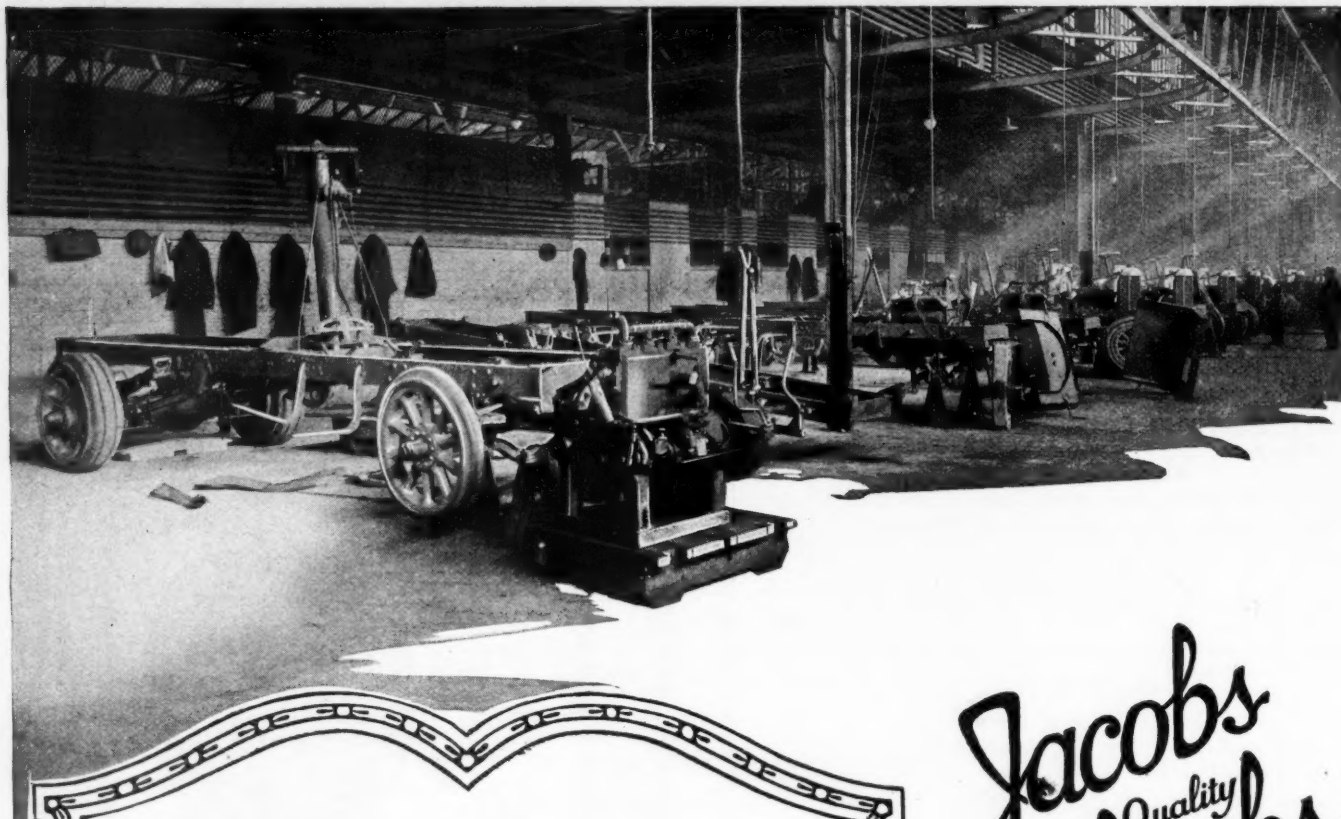
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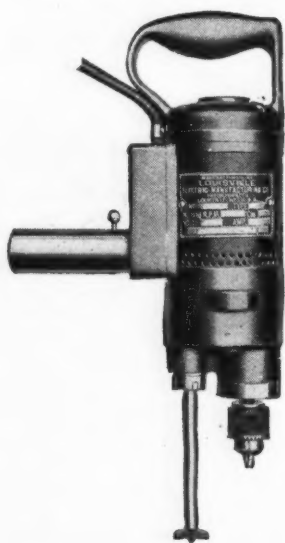
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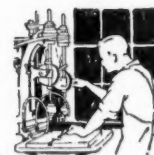
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# MOTOR AGE

## What Are Your Objections to the Flat Rate Plan?

*Perhaps This Article Will Dispel Them. Read It and See Whether You Can Afford Not to Work Out Fixed Prices. No System Is a Perfect Cure-all but This Plan Has Been Found by Actual Test to Be the Best Remedy Yet Offered for Owner Dissatisfaction with Service Bills*

By B. M. IKERT

**T**HAT there is as yet a lot to be said about the flat rate or fixed price system of selling service was clearly brought out by the discussions at the semi-annual meeting of factory service managers in New York last week.

It is not to be wondered at that the factory service managers as a body do not know as much about the flat rate system as they might know, because it must be kept in mind that this particular method of selling service, as well as any other, for that matter, is not a factory proposition. It is a dealer problem pure and simple.

No factory can be of very much assistance in shaping a dealer's methods and helping him install a flat rate system, unless it has on the road highly trained service experts who know the business from the dealer's side. Few dealers operate under the same conditions. No two organizations are alike. Hence the flat rate system must be molded by each institution to fit the immediate needs. Geographical distribution of cars makes a difference.

The dealer handling the Blank car in the mountain states will have problems different from the dealer operating in the prairie states.

The small shop may not have the same elaborate equipment as the large service station in the metropolitan areas.

The large institution with its better facilities may have its service and repair work on a production basis; thus the time factor is cut down and, as a consequence, the flat charge for the various operations is reduced. Therefore, two identical service operations on the same make of car easily might vary as to the flat rate charge for the operation in the large and small institutions.



By the use of the flat rate system of selling service the telephone operator is able to give to a customer the exact cost of any service operation he may ask about. In fact, it is possible for anyone in the organization to do the same

But it does not always work out that the larger service station is the more efficiently operated one. There are numerous instances where a live dealer in a small community has put his service station on a flat rate basis and is working head and shoulders above his competitor in the big city.

The successful operation of the flat rate system does not rest on the assumption that a dealer must live in a large city and cater to a large clientele. Some of the dealers now using this system with success reside in towns of less than a thousand people.

Just as soon as you get together a body of automobile men to discuss the flat rate system, there is sure to bob up the question of the whole

## What Some Service Station Operators Who Use Flat Rate System Think of It

**T**HE fixed charge plan is superior to all methods of hourly charge and the dealer who uses it has the advantage over the fellow who is clinging to the old method when both are working on the same prospect for a new car sale.

It is vital to success because a large number of sales will be turned to the dealer by the superior service.—Stuyvesant Motor Co., Cleveland, O.

**W**e tried the system out on paint jobs first. It appeared ridiculous for a man to come in with a car and ask us how much the job would cost and not to have the slightest idea how to answer his question. We figured time and material costs and began to make prices in advance. On the first four hundred jobs we came out \$44.30 in the hole.

The plan is not all sunshine at first. On some jobs money is lost and on others it is averaged up. It compelled us to have the best mechanics at work. Experience shows that the 85c man will make the most money for the company, while the 60c man has the largest number of loss cards placed in his mail box.—Willys-Overland Co., Inc., Toledo.

**T**HIS company finds many points of advantage in the Flat Rate System. We cite the distrust which car owners are apt to experience if they enter a service station and unexpectedly see the mechanic engaged upon their car apparently wasting the time which the owner thinks he is paying for.

Under the Flat Rate System the owner knows that no matter how much time seems to be wasted in the shop, the owner is not paying for it.—C. H. Williams & Son, Bloomington, Ill.

thing not being fair to the customer who takes good care of his or her car. Why should a careful driver and one who takes good care of his car be required to pay the same price on a certain job as the man who abuses his car on which the operation takes longer, is the question.

A service manager in a western state recently spoke about this. He said that two cars came into his shop one week and in both cases the work to be done demanded the front axle be removed. On one car the job was quite simple. On the other the spring clips and other parts were rusted to such an extent that the men in the shop had to resort to blow torches and chisels to free the axle. The latter job took about twice as long to perform as the first. This shop was not on the flat rate basis and the service manager asked, "How could we possibly charge the same amount for both jobs?" This is substantially the same question asked by hundreds of others in the industry, and on the face of it, perhaps, it is natural that they should do so.

Probably the best answer to this question is that in practice—that is, in actual operation, the flat rate system seems to be working out entirely satisfactory, and while occasionally a job comes in on which more time must be spent than allotted to the operation by the flat rate system, it is more or less automatically absorbed.

### EACH ORGANIZATION MUST WORK OUT OWN SYSTEM OF PRICES

These extreme cases occur seldom, and those operating on the flat rate basis will tell you that in the vast majority of cases the operations can be done within the time limit set by the flat rate system. For that matter, suppose a dealer operates in a community where his business is made up largely of servicing farmers' cars. If most of these farmers are careless in keeping up their cars, it simply means that this dealer must set his bogey that much higher over the man operating in a city, where the cars are not subjected to as severe a use.

That is why no two organizations can have identically the same price list in the flat rate system, and that also is why each organization must analyze its working condition.

To those dealers who are thinking of putting in the flat rate system, let us say right here that you are going to burn a great deal of midnight oil doing it. It is a mighty hard job and requires a tremendous amount of work.

We have talked with dealers who have knocked the flat rate system from every angle, and to come right down to brass tacks, the reason they were against it was simply because they had not the inclination or business ability to reorganize their shops to put the thing across.

It can't be done in a week. It can't be done in a month, two months, or even a year perhaps. Those who are today using the flat rate system with success will tell you that they planned for it as far back as two and three years.

When the dealer has installed the flat rate system, so that he has practically every service operation possible on a car listed, he has not done all there is to do. He must, or should,

keep accurate record on every operation as to the time required, in order that there may be an accurate check on the bogey to see if it is too high or too low.

A change in the design of some unit on the car may have a marked effect on the time factor in some service operation on that unit. So the flat rate system must be checked and rechecked all the time. And it is not such a difficult job to do it either. It is work for someone, of course, but work well worth while in the building up of good will.

So long as there seems to be so much general belief that the flat rate system cheats the careful car owner, it may be well to dwell a little more on this phase of it, because it takes in two factors:

- 1—Mechanical operations.
- 2—Psychological effect on customer.

For one thing, the careful owner does not know nor does he concern himself much about the fact that he pays the same price as the careless owner. A man may take a suit of clothes to a tailor to have it pressed. The suit may be in fine shape and yet this man pays as much for having his suit pressed as the man who presents to the tailor a more or less shabby suit full of spots.

The customer is used to doing business this way and, as far as that goes, the tailor might say to the man with the shabby suit, "Well, this suit will have to be cleaned, and that will cost you seventy-five cents extra." But the man with the well cared for suit does not need this cleaning, and the tailor is so much ahead.

In the same way, suppose A and B drive in their cars for the same service operation. A's car is easy to get at. B's is not. Let's say the work is to be done on the engine. A's engine is clean and accessible; B's is full of dirt and has many of the parts hidden. B's engine will first have to be cleaned.

There is a flat charge for his cleaning, and in making out the work tag this is listed along with the other operations. A does not get this cleaning operation on his work tag, and consequently his bill for the same service operation as B's will be less. Is there any unfairness about this?

### FLAT RATE SYSTEM OFFERS THE MECHANIC OPPORTUNITY FOR BETTER PAY

One of the most successful users of the flat rate system does this, as regards the ability to perform an operation in less time than that set for the operation:

If the mechanic does the work in less time than bogey, the difference is split between him and the customer. For example, suppose a job listed as requiring eight hours and the mechanic finds he has done the job in six hours. Let us say the flat rate for the operation is \$16, which could then be taken to mean that at \$2 per hour, to which the job could be reduced, that \$4 were saved over the set price.

Under the plan instituted by this organization the mechanic gets the \$2 added to his pay check and the customer who previously has been informed that the job would cost him \$16 is



told that, inasmuch as his car was well cared for and easy to get at, the job could be done for \$14.

There is no way to measure the good will resulting from this, except that we might say the customers are satisfied because they know what the job is going to cost—and come prepared to pay—and they feel they are doing business with a real concern.

The mechanics are satisfied because they have a chance to better their incomes and become real factors in the organization. They are regarded as producers. The management is satisfied because complaints are practically nil, and the service department is on a paying basis.

"But," you say, "suppose the mechanic does a rotten job?" This has all been cared for. If a car comes back and the work or part of it must be done over, the mechanic who did the job in the first place does so on his own time, and is therefore handicapped on whatever job he might have been working at the time.

Again, the question is often raised as to how a "trouble shooter" is going to give a man a flat rate price on a job on which he is not sure of his diagnosis. Thus, a customer

## Comparative Cost Chart to Check Flat Rate

Job No.	Mechanic	Flat Rate	Actual Cost
22147	H. T. K.	22.50	21.45
22345	F. H.	3.15	4.50
22986	M. M. G.	6.70	6.70
22667	F. H.	19.00	26.00
22588	M. M. G.	33.00	27.75
22143	F. H.	3.00	3.45
22147	H. T. K.	22.50	23.00
22390	A. L. J.	11.75	8.70
22701	M. M. G.	85.60	97.35
22994	F. H.	5.60	4.50
22005	A. L. J.	14.68	12.44
22115	M. M. G.	45.60	44.40
22444	H. T. K.	5.25	3.35
22688	A. L. J.	8.90 286.63	8.90 292.50
Guarantee			
22365	A. L. J.	4.50	

The flat rate system should be checked at all times to see how the business is going. The above might be taken as a day's work in the shop. On some jobs it will be seen that the men did the work in less time than called for, while in others the bogey has been placed too low. Constant checking of the figures over an extended period will produce a flat price for any operation and one that comes pretty close to insuring fairness to customer and profits to the dealer.

might drive in and have a knock in the engine which cannot be diagnosed on the spot, but which really requires a partial tearing down of the engine.

There is a simple solution for this. For example, if a car did come into the shop under those conditions and the shop was not operating on the flat rate basis, then the mechanic or service man might tell the customer the trouble was a rod, main bearing, loose piston or anything else, and the only recourse the customer has is to say to the shop, "Go ahead and fix it." Then the engine is torn down, the repair made and the customer billed for so many hours of labor and so much for parts, if they are needed.

Now, under the flat rate plan this can be handled something like this: there would be a fixed charge for the operation of tearing down and reassembling the engine. For example, if the timing gearcase cover had to be removed, it might mean draining the radiator, removing radiator, removing fan, etc., all of which could be listed as a flat price operation. The customer is told it will cost him so much to tear down

the job and make a diagnosis. It would have to be torn down anyway, so why not list it as an operation? Then the customer is again consulted and given a flat rate on the installation of a new timing gear, chain, or whatever is needed.

It might not be amiss to mention here that the flat rate system of handling repairs has brought to light some interesting facts. Where it has been installed, some startling revelations have been made. It has brought to light the fact that the supposedly good mechanic is not always the best worker. He may know all about the work in question, but his fellow worker may beat him to it when it comes to turning out a job well and in less time. In other words, the silent, plodding sort of mechanic may be the best worker so far as production is concerned, as compared with the more or less spectacular mechanic.

The flat rate plan furnishes the foreman of the shop with interesting figures and after a time tells him which man is the best man on valves, on piston work, assembly, etc. Eventually there comes a time when he has sufficient data to split his work so that the men work on the jobs to which they are best suited. Without keeping accurate records on the time factor and the duration of the repair, no foreman can tell the exact status of his men.

The very men who are drawing the most pay often may be the poorest producers. Thus, the flat rate plan has more to recommend it than merely the assurance that the customer is better satisfied. It produces business-building results right in the organization. It is easier for the bookkeeper, mechanic, customer and everyone else, because it is founded on a principle established years ago and found to be correct in businesses much older than the servicing of automobiles.

As P. E. Chamberlain said at the service managers' meeting the other day, back of any transaction we have the question of the customer, "What does it cost and when can I get it?"

## More Air-Cooled Engines

Automotive Industries, Nov. 17, 1921

THAT we are on the threshold of renewed activities in the air-cooled field is quite evident. While much of this activity is no doubt caused by reports which have been circulated throughout the trade for a year or more that one of the largest companies in the industry has been developing a product with air-cooling, other interests have also been actively engaged in research along this line.

There is an increasing demand for higher thermal efficiency as one of the means of conserving fuel, and some engineers believe that air-cooled engines are inherently more efficient than the water-cooled type. It is quite certain that some things have been found out regarding air-cooling which will make it possible to overcome some of the few objections which have been offered to this type of engine.

It is a significant fact that the one air-cooled car, which has been manufactured in quantity, has been highly successful and the earnings of this producer have been one of the remarkable accomplishments of the industry. It is certain that by the elimination of the water system, a certain amount of weight can be saved, which will have its effect on the economy.

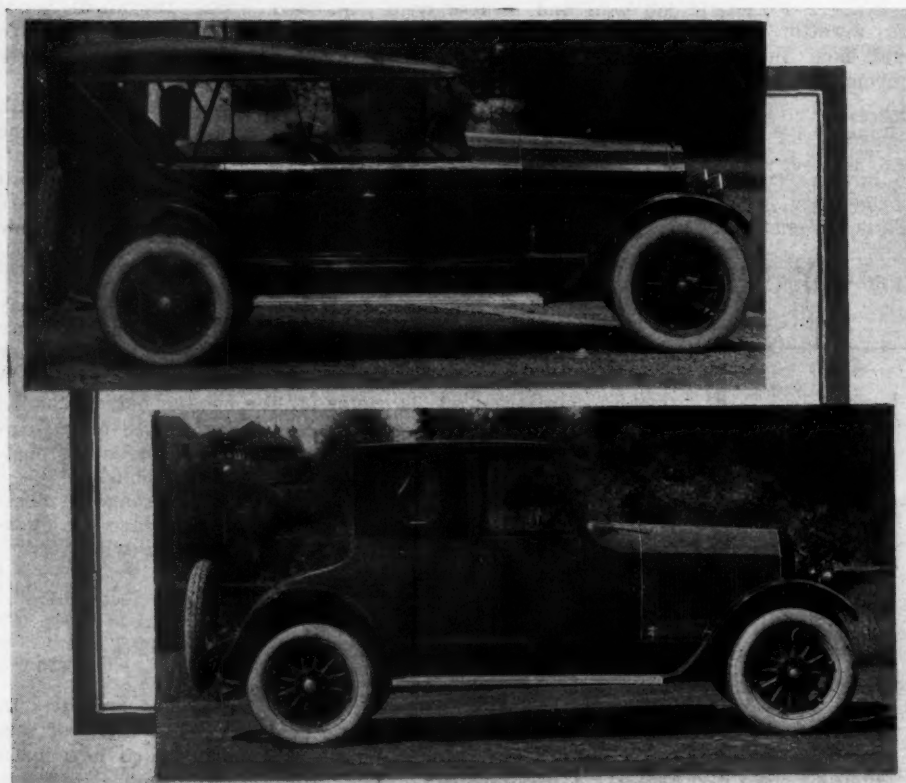
If the air-cooled engine runs at higher working temperatures it may, under certain conditions of operation, prove more economical. If the working temperature is higher than in the water-cooled car, there may be certain advantages in vaporization of the fuel which are also secured and which tend to increase the mileage possible per gallon of fuel.

Air-cooling in the past has been limited to a certain maximum size of cylinder, according to the views of many advanced engineers. However, it seems that discoveries which have recently been made in new cooling methods and particularly in increasing the effectiveness of the cooling fins may result in increasing the maximum cylinder size. If there is going to be a demand for smaller, higher economy cars, the average cylinder size will decrease and the difficulties of air-cooling will be lessened.

At any rate, we are surely on the eve of some important announcements in this field, which will be anticipated with great interest by all automotive engineers. This is particularly true, as the field is not restricted to passenger cars, but covers trucks, stationary powerplants, tractors and aircraft as well.

# New Cole Series More Accessible

*Change in Piston Design Claimed to Eliminate the Troubles Due to Expansion Differences Between Iron and Aluminum—Frame Larger and More Rigid*



Top—Cole Tourster, a seven-passenger car finished in deep blue with blue wheels and black trim. Lower—The Cole Sportcoupe, a four-passenger type finished in maroon, blue or grey with black trim

**W**HILE the major specifications of the Cole Aero-Eight have not been changed in the new model, known as the 890, there are a number of important changes tending to make the car easier to handle, from the standpoint of the owner, and at the same time more readily accessible from the standpoint of the service man.

Among the more important changes is the adoption of a new piston, said to eliminate the difficulties due to expansion differences between iron and aluminum. There also is a better layout of the brake operating levers. The clutch pedal pressure necessary to operate it has been reduced to 20 lbs. The frame has been made more rigid and larger dimensions have been used in some of the other essential units.

The engine is the Northway, model 309, eight-cylinder,  $3\frac{1}{2}$  by  $4\frac{1}{2}$  in., with a piston displacement of 346.3 cu. in., and an S. A. E. rating of 39.22 hp. The engine at 2800 r.p.m., its peak, develops 80 b. hp., it is stated.

The new piston is die-cast aluminum. It is a constant-clearance type, being oval in shape at the skirt. The piston

is slotted in such a way as to give a slipper effect. The slot extends circumferentially about the piston below the bottom piston ring land, the slot being made by a  $1/16$  in. cutter at this point. The piston has four rings, three above the wrist pin and one below. The lowest of the three upper rings is a pressure proof, double ring. The clearance at the top of the piston is .019 to .021 in., and at the bottom .0015 to .0025. From these figures it will be seen that the piston is a snug fit in the cylinder, even when cold. Around the bottom piston ring there are eighteen  $5/32$  in. holes drilled at 45 deg., to act as oil drains and similar oil drain holes are cut below the lowest of the three upper rings.

The piston pins are fastened by set screws in the pistons. They are .8555 in., outside diameter, and  $\frac{1}{2}$  in., inside diameter. The piston pins are bronzed brushed, providing a bearing length of  $1\frac{1}{8}$  in. The connecting rods are forked and blade type  $9\frac{1}{2}$  in. in length center distances. The crankshaft has three main bearings and is of 2 in. nominal diameter. The bearing lengths, front to rear, are:  $3\frac{3}{4}$ ; 3 in. and  $3\frac{15}{16}$  in. The

crankpin bearings are  $2\frac{1}{8}$  in. in diameter by  $2\frac{1}{2}$  in. in length.

The timing gears are the helical spur type, the crankshaft gears being of steel and the camshaft gear a built-up Fabroil unit. A  $11/16$  in. diameter camshaft is mounted on three bearings whose lengths are, respectively, front to rear, 3 in.,  $2\frac{1}{2}$  in. and  $2\frac{1}{2}$  in. The camshaft also carries a spiral gear for driving the distributor, this spiral being integral with the shaft. The camshaft provides a lift of  $11/32$  in., and the valve dimensions are identical for inlet and exhaust, although the materials are different. The seat diameter is  $1\frac{1}{2}$  in. The stems are  $\frac{3}{8}$  in. The valve springs are 35 to 40 lb. for both inlet and exhaust. The valve timing is as follows:

Inlet opens 15 deg. after upper dead center

Intake closes 38 deg. after lower dead center

Exhaust opens 45 deg. before lower dead center

Exhaust closes 10 deg. after upper dead center

Oiling is by pressure feed from a gear pump mounted on the crankshaft. The normal oil pressure is 15 lbs., and the oil circuit includes leads to all of the engine bearing surfaces. The gear pump is readily accessible from the outside of the engine and can be removed by taking out the cap screws which hold it against a flange at the front end of the engine just below the timing gearcase. A detail improvement has been revised to obtain a quiet and more efficient assembly.

An alteration has been made in the water system by the incorporation of thermostats which are placed on the water outlet of each cylinder head and used for the purpose of regulating water temperature and shortening the period of time required for warming the engine. The thermostats are of the Sylphon type and are set to open at 150 deg. Fahr. The water pump is driven directly from the front end of the crankshaft and is a four-blade, impeller type. The gasoline system is fed from a 20 gal. tank on the rear of the chassis through a 2 qt. vacuum tank to a  $1\frac{1}{2}$  in. Johnson carburetor. Ignition, starting and lighting is by Delco.

The clutch still is of the cone type with fabric facing, but now has a materially reduced foot pressure requirement and the cone is reinforced on the outside diameter to prevent distortion. The clutch is equipped with a bearing device which functions immediately with the clutch release and automatically increases the braking pressure with additional disengagements, which can be ad-



justed as occasion demands. Provisions are made to lubricate the clutch release bearing direct from a tube located on the front of the dash. This tube leads directly into the bearing and a few drops of oil placed in this tube entrance at the dash periodically will keep the clutch release lubricated.

Another improvement is the use of coil engagement springs in place of the flat engagement springs which were formerly employed. These are mounted in small cages and can be adjusted to give the desired action. The clutch brakeshoe is on a spring and the cone is flanged over with a stiffening flange at the rear. This stiffening flange comes against the clutch brakeshoe and acts as the frictional drum.

The transmission gearset is a Northway. The drive is through a Spicer propeller shaft with two universal joints. The rear axle is a Columbia, three-fourth floating, with spiral bevel gears furnishing a reduction of 4 5/11 to one on all models. There is an option, however, on the roadster and sport model of 4 1/12 to 1. The rear wheel bearings on these axles have been simplified so that the locking device is such that it is unnecessary to replace this part when an adjustment is made.

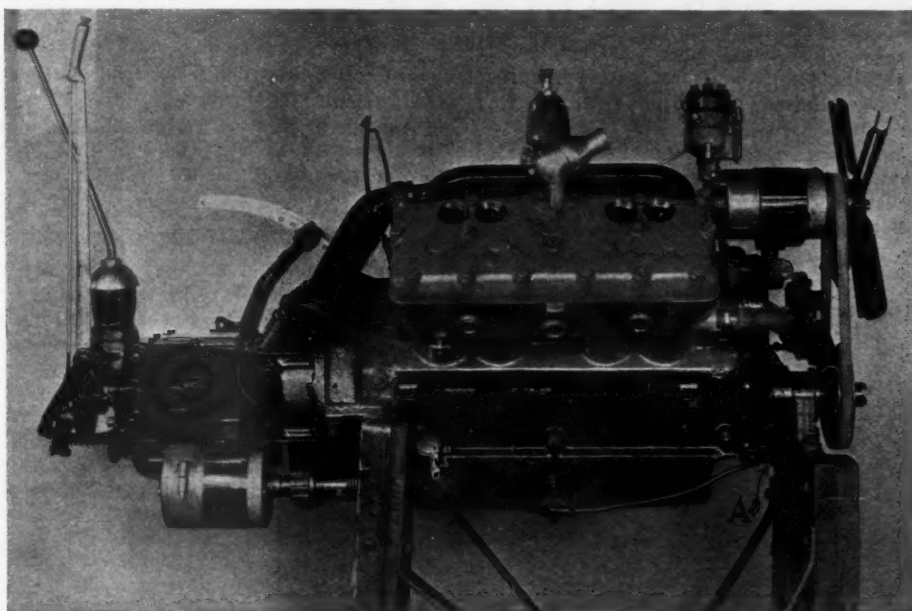
Another improvement is in laying out the centers of the brake operating linkage. The inverted type with the first center below the center line of the axle is now used for the operating link, which, in connection with the Hotchkiss drive, gives maximum braking without chatter. The leverage has been increased, so that light foot pressure only is required to secure full braking operation. The service brakes are external contracting and the emergency internal expanding. Oilless bushings are employed in the brake shaft. The front axle is a Columbia mounted on Bock bearings.

The frame has been stiffened. Tubular members have been added

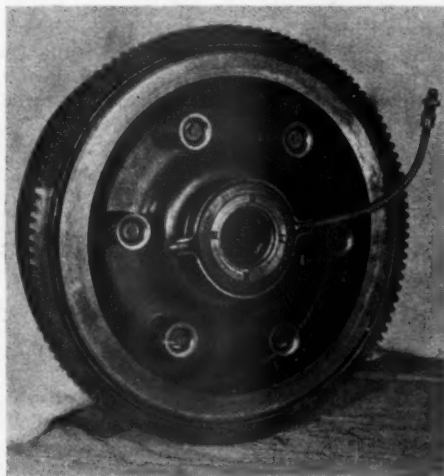
front and rear to prevent side weaving. The independent radiator and front engine support cross-members formerly used, are now combined into one rigid, wide unit, materially strengthening the frame to resist twisting strains. A new cross-member is located behind the transmission gearset and ties the frame securely at this point to prevent body strains. Welded, anti-squeak material is now used between all sheet metal parts, and a thick, wide cork anti-squeak is placed between the body and the frame to give a firmer and quieter support for the body.

#### RADIATOR SUSPENDED ON COIL SPRINGS

The spring shackles are now adjustable to eliminate noise caused by side slap, and the radiator assembly is mounted on a coil spring suspension to relieve the core of all strains and eliminate squeaks and rattles.



Right side of the Northway engine used in the series 890 Cole. Each cylinder block is fitted with a thermostat at the water outlet. The oil pump is removable by taking out the cap screws at A



Coil engagement springs are now used on the Cole cone clutch. Note the oil tube to release bearing. Oil is placed into the tube from the driver's compartment



The new Cole piston. The pencil points to the slot which extends circumferentially about the piston to give a slipper effect

An adjustable tie-bar is now used between the radiator assembly and the dash of the body to keep these parts in line. This tie is an addition to the support formed by the center panel of the hood which is bolted to the radiator shell and the body dash. The hood itself has been materially improved in that heavier gaged stock is now used and reinforcements have been made in the hinge construction. The hood fasteners are adjustable as to spring tension.

The rear spare tire carrier has had a bottom brace added to assist in rigidity, and the windshield assembly on the open model now has stanchions supported in a bracket having a firm footing in the body structure. All of these increase the rigidity of the entire assembly and help do away with rattles.

There are nine body models, known as Tourster, Roadster, Sportster, Sportse-dan, Sportosine, Sportcoupe, Turosine, Toursedan and Californian. The Tour-

ster is a seven-passenger touring body, finished in deep blue with blue wheels, black fenders and trim. The Roadster is finished in ruby red or deep blue with black chassis. It has a two-passenger capacity with Victoria style top in black leather, cloth lined. The Sportster is a four-passenger body in ruby red or deep blue with black trim. The Sportsedan is a four-passenger type, finished in gray or deep blue with wheels to harmonize. The chassis is black.

The Sportosine is a six-passenger model with a disappearing glass partition between the front and rear compartment. It is finished in deep blue or gray.

The prices on the Cole cars remain unchanged, the touring car selling for \$2485, the four-passenger sport and the roadster being also priced at this figure, with the coupe type of body \$3385, and the sedan \$3685. The 33 by 5 in. tire size is standard throughout the line and all these bodies are mounted on the same wheel-base of 127 in.

# Blacksmithing a Necessary Part of Efficient Service

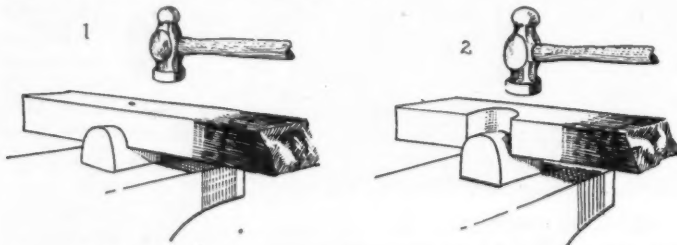
*The November 3 and November 17 Issues of MOTOR AGE Contained Practical Articles on Adding This Department for Profit and Better Service*  
*Blacksmithing Is an Interesting Study. Here is Another Lesson*

By R. C. JONES

**T**HIS week we will make a pair of tongs for general work. Two pieces of three-quarter inch wrought iron, 12 in. long, are needed. Make a punch mark two inches from one end of one piece, set the three-eighths inch fuller in the square hole of the anvil, and get a white heat about four inches long on the punched end. Set the punch mark over the center of the fuller, and drive the fuller a little less than halfway through at right angles to the bar (Fig. 1).

Lay the bar over the anvil with the fuller-mark verticle, and drive back the metal that has spread at the ends of the mark. Strike again on the fuller, and again drive back the spread metal until the bar is straight-sided and the fuller-groove nearly halfway through.

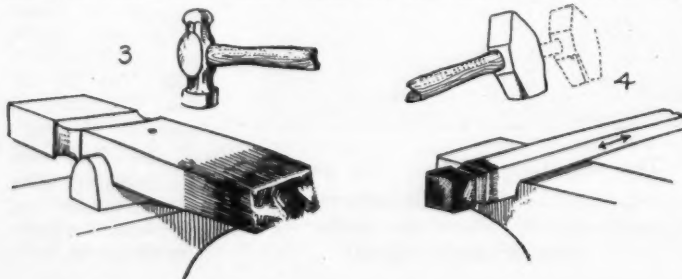
Then turn this fuller-groove to your left hand, and make another groove on the adjacent side coinciding with the first one, as shown in Fig. 2. Here the metal will spread into the first groove. Set the first groove on the fuller and hammer the spread metal out. Turn from groove to groove until they meet with a clean-cut mitre.



Now heat, mark, and fuller the other piece as you did the first, with this difference: turn the first fuller-groove to your right hand instead of your left. Mark this bar again,  $1\frac{1}{4}$  in. from the center of the first fuller-groove, and on the same side as shown in Fig. 3. Make a groove on the side opposite the mark, as you did at first, at an exact right angle to the bar.

## "Overhanging Blows" Demonstrated

Next call your partner to strike with the sledge. Set the last fuller-groove with its middle line right over the edge of the anvil. Strike with part of the sledge face overhanging the edge of the anvil. Two or three blows of moderate strength here should start the drawing nicely. Turn the bar on its sides frequently, so it will not be spread too much. Slide it along and strike with the full sledge face over the



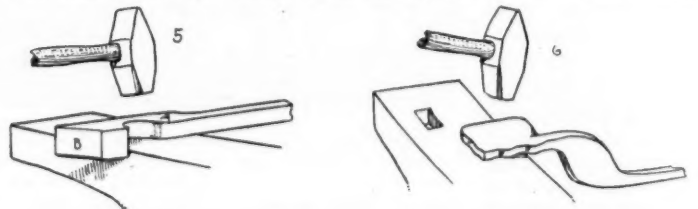
anvil, still turning from side to side to keep the width about three-quarters of an inch. You now should have a bar shaped as shown in Fig. 4. Notice that one remaining fuller-groove is parallel to the face of the anvil, and one parallel to the side.

Set the latter groove over the edge of the anvil. Strike again with the sledge, starting with the face of the sledge overhanging the anvil edge and working over onto the face of the anvil, sliding the bar back and forth as before. This should result in a shape like that shown in Fig. 5. A few blows with the hand-hammer on the edges of the web "A" between blows of the sledge will keep the web in shape.

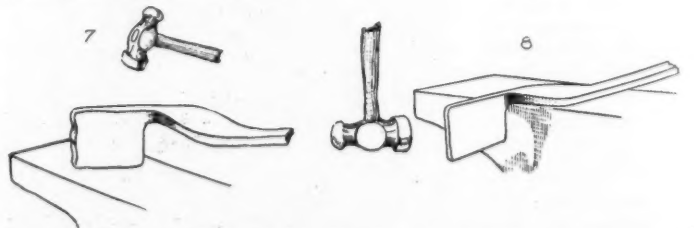
## Aim Blows Very Carefully

Unless you hold the bar firmly on the anvil and caution your helper to strike squarely, you are apt to get the bar out of square, so the cross-section will be in the form of a diamond. This makes little difference on the present job, but causes all sorts of trouble when accurate work is required.

When the web A is about three-eighths of an inch thick and the handle is drawn out to a section about  $\frac{3}{8}$  in. by  $\frac{1}{2}$  in. start working the jaw. Heat the end B, shown in Fig. 5, lay it on the anvil with the remaining fuller-groove overhanging the edge near you. Draw it as shown in Fig. 6. Then shape



up as illustrated in Figs. 7 and 8. Then go back to the beginning with the other piece and follow the same work through. Bear in mind that it is the opposite of the first piece. If you followed directions exactly in making the first fuller-grooves you will have no trouble.



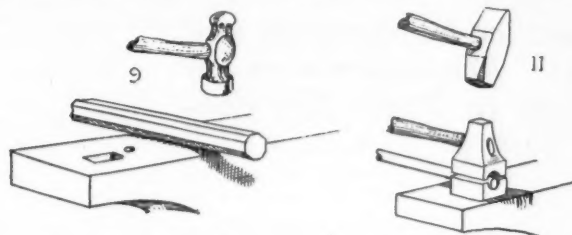
Now you can give your partner a rest while you taper the handles. Draw them to an octagonal section for about three-quarters of their length, measuring from the end of the handles, tapering to a quarter-inch octagon at the end. Slender handles have a little "spring" that rests the hand through a long job and they retain the "gripping link." This is a simple bent rod three-sixteenths of an inch, shown in Fig. 10. You can make it in five minutes some day when there's nothing better to do.

Set your quarter-inch bottom swedge in the square hole and



lean the corresponding top swedge against your side of the anvil. Get a long heat on a handle of the tongs and place it edge up between the swedges. Strike lightly, moving the handle less than the length of the swedge, so there is at least an inch overlap. Keep the alignment true and the swedges in contact throughout their length or you'll get a finish full of notches instead of a round, smooth surface.

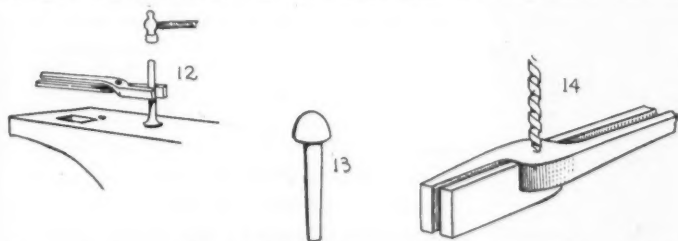
As you approach the end turn the iron round and round, so that the entire surface is swaged. Plenty of care and pa-



tience will give you a smooth cylindrical surface over half the length of the handles, with rounded narrow faces near the web. Then, with light blows on the flatter, smooth down all the flat surfaces. This finishing work should be done at a lower heat than the shaping. A dull orange that cools rather rapidly to a cherry is about right. Lay the swedges near but not in the fire before starting with them and your heats will last longer.

#### Upsetting the Rivet

Get a two-inch length of round stock just the size to slip through the pritchel-hole (the little round hole near the heel of the anvil). Heat one end white and dip the other end in



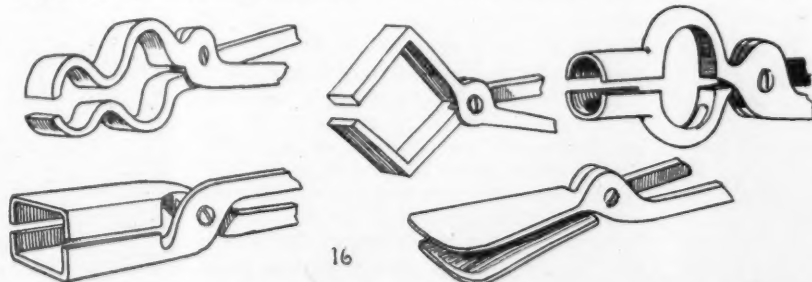
the water so that a half inch remains above the surface. Stand it upright on the anvil, hot end down, and strike hard on the other end. Repeat this until you have a mushroom on the end (Fig. 12). This is called "upsetting."

Now hammer any burr off the cold end, heat the mushroom, cool the shank and drop it into the pritchel hole. With the ball pen, shape the mushroom into a rivet head. Make it much higher domed than it is wide. Do this by holding the shank nearly parallel to the face of the anvil and rolling it along while you tap the hot head all round, in the direction indicated by the arrow.

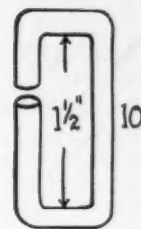
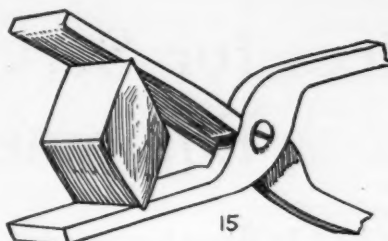
Bore the rivet hole the same size as the pritchel hole, using one-half the tongs as a jig for the other half, keeping the jaws in alignment about one-quarter of an inch apart as you do (Fig. 14). Heat the rivet white and rivet the halves together.

#### To Make the Grip Universal

So far, for all practical purposes, the tongs are complete. But they can be greatly improved by notching the jaws to

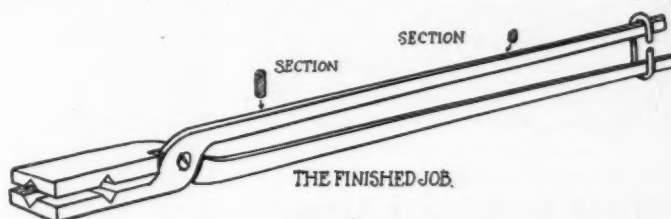


Anvil-tongs are most useful, for they will pick up nearly anything. (Upper left) Square side-grip, bolt tongs, square end-grip, and duck-bill tongs for handling plates are just a few of the most useful shapes. You will invent others as need for them arises



take either round or square stock without permitting it to turn and twist while held. To do this, get a short length of half-inch square steel. Heat the jaws of your new tongs white and grip the steel with the edges touching the jaws, at right angles to their length, at the middle (Fig. 15).

Drive the jaws down onto the edges, striking each jaw alternately, so the grooves will be of equal depth. Heat up again, grip the steel with the edges touching the center line of the jaws, parallel to their length, and again drive the hot jaws down onto the edges. This will put the jaws somewhat out of shape, but a few blows well-placed will bring them back to normalcy.



#### A Few Hints About Tongs

Shape the tongs to the work at each new job by heating the jaws, gripping the work and squeezing the handles together or drawing them apart until the gripping link will not quite slip onto the handles. Then cool the tongs, grip the work, spring the handles and slip on the link. A few blows on the jaws may be necessary while they are hot.

Carefully fitting your tongs means lots of labor and cussing saved, faster work, and much less danger of burns. Keep the rivets headed well up against the web. Rivets need frequent replacing. Loose rivets make tongs slip and fly open—always when you're in a hurry. Take the tongs off the work, if the heat will take much time. Cool them frequently.

#### Importance of the Fuller

It would have been just as easy to start this job with the overhanging blows of the sledge on the edge of the anvil. It would have saved a lot of work and made the job just as good, if not better looking. Then why take all that trouble?

Iron particles hold together better when they lie along a curve than they do along a sharp bend. That is the reason for fillets along the webs of castings and I-beams. The main reason why threads strip is the sharp angle at their base. The fuller forces the iron to flow along curves, giving much greater strength than when sharp bends are used, as described in the last article. Use the fuller intelligently whenever opportunity offers and your smithing will stand up better in service.

The next article will deal with the making of a tool-rack.

# New Devices for Service Offered at A. E. A. Equipment Show

*Time and Money Savers for the Service Department and Motor Car Accessories Indicate Manufacturers of Them Are Giving Serious Thought to Their Development and Practicability*

A VERY practical automobile dealer who visited the A. E. A. equipment show left the Coliseum singing praises of the display that Commissioner Webster's boys had put together. It was a practical show, as was proven by the very high record of sales made by the firms represented there. The steadily increasing demand for space is ample evidence that this show has a place in the economics of equipment sales.

It is not a pretty display. It is not attractive to any but the man who is interested in the automotive business,

and that is one of the fine things about the show. It is the front door of the annual convention, and dealers, jobbers and manufacturers use it as sort of a clubroom in which to discuss business while surrounded with an atmosphere of business.

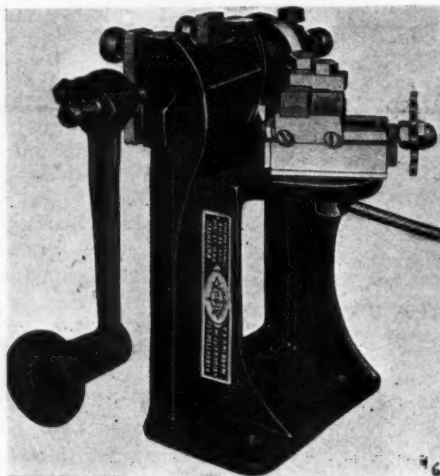
There was not much new in this last show, not as much as usual. But what was new averaged above the standard of former years, which fact goes to show that manufacturers in this line are taking quite seriously the project of placing a new article on the market.

## LITTLE SIOUX VALVE LATHE

This new addition to the Sioux family is a neat and compact hand machine having all the exactness of a large lathe. It is capable of making cuts at any required angle, but the standard angles of 30, 45 and 60 deg. are plainly etched on the tool so that the most inexperienced workman can make no mistake.

The tool holder is adjustable in and out, but not up and down; thus the cutter must be always in the proper position to the valve and cannot get out of the cutting line. The cutting tool is circular in form and is made of special steel, capable of cutting anything from cast iron to tungsten steel. Its circular form makes it possible by turning to get clean cutting edges as long as the circumference remains usable. The cutters can be sharpened and new ones can be obtained at any time. The price complete is \$12.50; extra cutters, \$1.50 each.

This company is also showing a flexible shaft and chuck which may be attached to a motor or any other driving power. Three operations may be performed with this tool, it being provided with a head for valve grinding and also for drilling or grinding with a small



Little Sioux valve lathe

emery wheel. Albertson & Co., Sioux City, Ia.

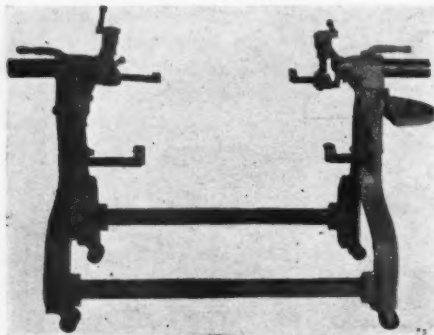
## ADJUSTABLE FOUR-WAY TORCH

An adjustable four-way torch with three burners for use especially on Ford and Fordson crankshaft bearings has been developed recently. By its use three torches may be played directly on the old babbitt of the bearings, melting it and at the same time preheating the bearings for the reception of new babbitt. These burners are fitted with the new double needle valve, differing from the old valve in that instead of a single needle there is one that controls the flow of gasoline or kerosene and another equipped with a wire tip so placed that by screwing it in the orifice of the burner may be always kept clean and free from stoppage. Besides the four-way torch, the Clayton & Lambert Mfg. Co., Detroit, has a full line of torches with the improved double needle burner.

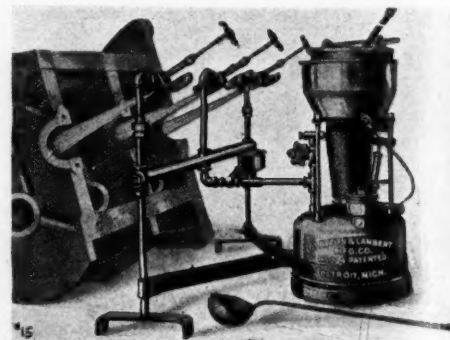
## UNIVERSAL ENGINE STAND

This stand is exceedingly complete. It is designed to hold any engine from the very heaviest truck to the smallest motorcycle motor. It has been tested with 5000 lbs. of pig iron to prove its sturdy qualities, so that there is no question but that it will handle any engine made. The adjustments of this stand are almost unlimited. By moving the two main shafts towards the center, nearly any size engine can be accommodated, but should this fail, there are adjustments at the bottom which allow the whole end sections to be moved toward the center.

At the ends of the cross-arms other joints and clamps are provided, which make it possible to attach to any form of engine support, and when these supports are all connected, the engine may be balanced so that a workman may swing the engine over at will with very little effort. The stand lists at \$51 and is manufactured by the Canedy-Otto Mfg. Co., Chicago Heights, Ill.



Universal engine stand



Adjustable four-way torch for re-babbiting bearings



**CYLINDER REBORING MACHINE**

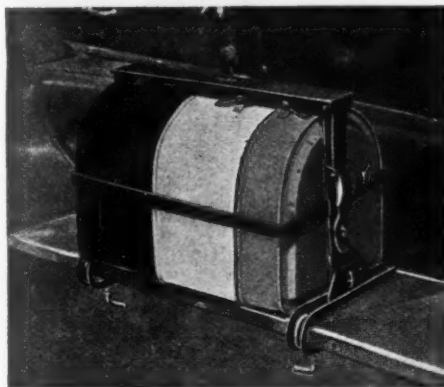
This is a sturdy motor-driven re boring machine designed to meet the needs of the repairshop handling all makes of cars. It is capable of handling engine blocks up to 20 in. in height and has two adjustable heads, each head having six high-speed steel spiral cutters, universally adjusted. The capacity of these cutters ranges from bores of 2½ in. to 6 in. and 14 in. in depth. The machine can be had either with motor drive, as shown, belt drive, or drillpress drive. When desired, the machine may be detached from its base and mounted directly upon a cylinder block in the chassis, thus relieving the service man of the necessity of taking out the engine. The price of this machine is \$354.30. Storm Mfg. Co., Minneapolis, Minn.



Storm cylinder re boring machine

**GASOLINE SEDIMENT STRAINER**

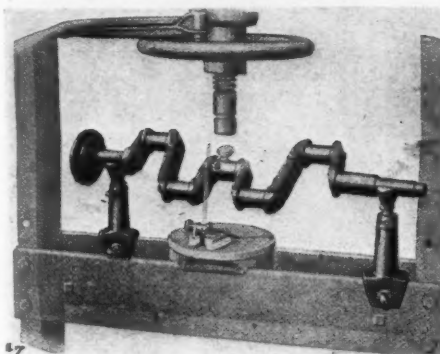
This device is designed to remove all dirt and water from gasoline before it enters the vacuum tank. The outfit contains all the necessary couplings and connections so that the dealer can attach it with a wrench or pair of pliers. The device takes advantage of the intermittent flow of gasoline produced by the vacuum tank, since when the gasoline is flowing through the strainer, the dirt is held on the under side of the screen, but when the flow stops, the dirt falls off and settles to the bottom of the container, where it remains until removed. The price is \$3. Imperial Brass Manufacturing Co., Chicago.



Runningboard service units for gasoline, oil and water

**ATTACHMENTS FOR WEAVER FORCING PRESS**

These attachments consist of two V-blocks which are held rigidly to the cross-bars of the press by heavy set screws. They are adjustable up and down and the whole assembly is movable from side to side on the cross-bars. When a crankshaft or other article to be bent or straightened is placed upon these V-blocks, it can be easily bent to any extent by the action of the press, and the adjustments make it possible to accommodate anything of ordinary length. Another feature added to this press is the riveting head and rivet punching tool. Weaver Mfg. Co., Springfield, Ill.



Attachments for Weaver forcing press



Bussman complete stock of automobile fuses in cartons



Imperial gasoline sediment strainer

**RUNNINGBOARD SERVICE UNITS FOR GASOLINE, OIL AND WATER**

In some sections of the country where filling stations are at great distances apart, this device should meet ready sale. It consists of cans for gasoline, oil and water provided with a strong iron clamp and holder securing them firmly to the runningboard. The latest type of this device has an iron arm with a hasp and padlock, so that there is no chance of the contents of the can being stolen.

Each can is provided with a screw top, and inserted in one of the cans is a flexible tube with a screw end, fitting the same screw that carries the top. This flexible tube makes it possible to pour the contents of the can into otherwise quite inaccessible places.

It is manufactured by the Boyle Mfg. Co., Los Angeles, Calif., and prices vary slightly with the different sizes. This company also shows the Boyco Speedol grease machine, by which it is possible to deliver through a tube a measured amount of grease by opening a valve. When the valve is open, one-half pound, or any otherwise predetermined amount, is delivered, then the grease stops running; when the valve is turned in another direction a like amount is delivered and the flow again stops. This machine should be of aid in selling grease at service stations.

**LOCK WASHER ASSORTMENT FOR DEALERS**

This is a very complete assortment of lock washers of S. A. E. standard sizes put up in a box and especially attractive for garagemen and dealers. It consists of 300 washers ranging in size from 3-16 in. to 3-4 in. If a larger stock is desired, the washers may be obtained in a package assortment containing 100 two-ounce packages, ranging from 3-16 in. up to 5-8 in. These two assortments are the latest addition to the line of the Reliance Mfg. Co., Massillon, O. The former assortment sells for \$2 per box and the latter at \$12 per carton.

**ASSORTED STOCK OF AUTOMOBILE FUSES**

A complete stock of fuses put up in an attractive form is being brought out by the Bussmann Mfg. Co., St. Louis. There are two stock packages, one selling at \$4.50 and the other at \$8.40; either one of these stocks will supply fuses for any car that is now being driven. When the small cartons contained in the large box are exhausted, they may be reordered from the jobber, keeping the stock complete.



Reliance lock washer assortment

### EMPRESS HIGH PRESSURE LUBRICATING SYSTEM

The principal feature of this system is that the pressure is built up in the gun by holding it in check through the operation of the small valve in the nozzle. When the nozzle of the gun is inserted in the grease cup or receptacle a small pin contained in the grease cup projects into the nozzle, opening the check valve and allowing the grease held under pressure to be released and ejected into the cup, and through it into the bearing. The pressure built up in the gun by one turn of the handle is from 500 to 800 lbs., and this pressure the makers contend is sufficient normally to inject grease into any bearing.

From the fact that the handle of the gun does not have to be turned at the time the grease is ejected, it will readily be seen that this gun is easy to handle in inaccessible places; the handle is simply given a turn as far as it will go and then with one hand the nozzle of the gun is inserted in the cup or receptacle, when the grease is automatically discharged.

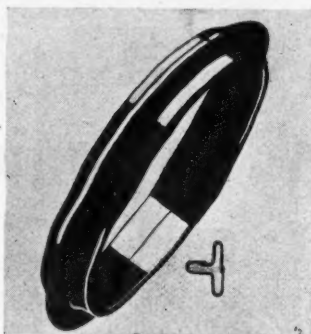
Oil can be used and also kerosene in flushing out a bearing, and in case the gun is left at home or misplaced, oil may be used in the cups from an ordinary oil can. Adapters can be furnished to fit all standard grease cups or special cups on any make of car. The cups are furnished in straight connections and 45 and 90 deg. elbow connections, and all have tight fitting dustproof caps. There is a special outfit for Ford cars and trucks. Bowen Products Corp., Auburn, N. Y.

### COMPLETE VULCANIZING PLANT FOR DEALERS

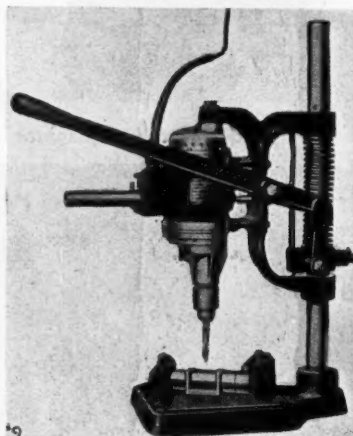
This plant comprises a boiler, three sizes of casing moulds capable of handling any tire from 3 in to 5½ in., two internal vulcanizers and a tube plate of several tube capacity. The casing moulds are mounted above the boiler, so that there is no waste space whatever and the whole assembly takes a minimum amount of space. The boiler is heated by two kerosene or gasoline burners, either of which will generate sufficient steam to operate on anything but full capacity. Gas burners will be furnished for purchasers who prefer them. The list price is \$500. A. C. Shaler Co., Wau-pun, Wis.

### HEAVY DUTY ELECTRIC DRILL

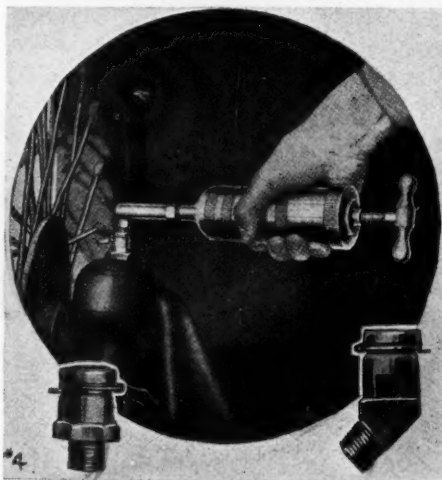
This drill is a very heavy and sturdily built machine, weighing 21 lbs. and having a capacity up to one-half inch. It is built for heavy service and continuous production, and is said to stand the most severe usage. It is supplied with Jacobs chuck and has fittings for three forms of application: the grip handle, breast plate and screw feed, the latter being very serviceable where drills upward of one-quarter of an inch in diameter are used. A portable bench drill stand can also be supplied with this drill, which converts it into a most useful bench drill press.



Two-in-one gasket



Temco heavy duty electric drill



Empress high pressure lubricating system



Johnston visible gasoline filter

The bracket which carries the drill can be easily raised and lowered on the vertical column or swung completely around the column. This bracket can be secured in any desired position by means of a lock screw and collar. The height of the column is 30 in., the vertical movement of the bracket 12 in., and the distance from the column to the drill point is 7 in. The drill travel is 4 in. and the weight of the stand complete is 70 lbs. The Temco Electric Motor Co., Leipsic, O.

### JOHNSTON VISIBLE GASOLINE FILTER

This is a very simple and effective visible strainer to be applied on the gasoline at its entrance to the Stewart vacuum tank, and is supplied in so complete a form that it can be applied with a wrench or pair of pliers. The gasoline line connection to the tank is first removed and the connection transferred to the entrance of the filter; the exhaust side of the filter is then coupled to the vacuum tank where the gasoline line connection was removed.

The operating part of the filter consists of an inverted glass thimble or cup into which the gasoline is drawn from the gasoline line. Before it leaves, however, the gasoline must pass upward through a very fine mesh screen. Passing upward as it does through this screen, all dirt and water is caught on the under side, and, as the flow is interrupted by the stopping of the suction through the vacuum tank, the dirt and water held upon the screen drops back into the bottom of the glass cup, where it remains and is plainly visible. This glass cup may be easily removed by unscrewing a knurled coupling without the use of tools. The price complete is \$3. William R. Johnston Mfg. Co., 451-469 E. Ohio St., Chicago.

### TWO-IN-ONE GASKET

This gasket has been made heretofore in a different form, but the present is an improvement having a double thickness pilot ring. It is called two-in-one because it combines the gasket with the pilot ring which fits into the inside of the exhaust or intake manifold, holding it firmly in place until the manifold is tightened. The two-in-one gasket has been made for Ford cars, but it is now being made for Buick, Maxwell, Overland and Studebaker, as well. These gaskets come in cartons of 100 and retail at 10 cents each.

This follows the style of the regular McCord copper asbestos gasket, but the pilot ring is the distinguishing feature and the new form, being double metal, makes the gasket very durable and sturdy. The McCord Co. is also announcing a honeycomb radiator of their standard pattern made in the Ford size for replacement jobs. This is the first time the McCord Co. has entered the replacement field. The price has not yet been announced. McCord Mfg. Co., Detroit.

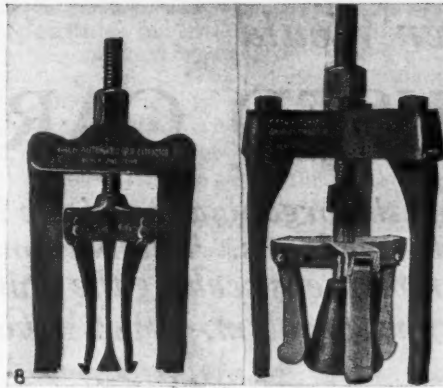


### ADJUSTABLE KEYSTONE PILOT PISTON PIN REAMER

An improvement on the ordinary expanding reamer is added here by the extension of the reamer shaft at its forward end, so that in reaming wristpin bearings this extension or pilot is held firmly in alignment in the far side of the bearing while the near side is being reamed. The pilot being of a size to fit very tightly in unreamed bushings, keeps the reamer true, so that when the reamer reaches the far side, there is no chance of its being off center and nothing is left to the skill of the workman. The reamers are built in 12 sizes, from  $\frac{5}{8}$  in. to  $1\frac{1}{2}$  in., and range in price from \$8 to \$20. George H. Wilkins Co., 180 North Market St., Chicago.

### ELECTRICAL TEST BENCH FOR FORDS

This is a very complete test bench for Ford starting motors and generators, equipped with growler and all the voltmeters, ammeters, rheostats, etc., necessary in shooting trouble on these machines. One of the features of this bench is the quick-acting clamp by which the



Greb automatic extractor for removing inside races, cups, bearings, bushings, etc.



Keystone adjustable pilot piston pin reamer. The reamer shaft is extended at its forward end

motor or generator may be attached in an instant. The price has not been announced. Joseph Weidenhoff, Chicago.

### AUTOMATIC EXTRACTOR

An automatic extractor for removing inside races, cups, bearings, bearing sleeves, bushings, etc., has been brought out by the Greb Co., Boston. It is built in two sizes and consists of a crosshead carrying a screw and supported by two legs or braces. Upon the end of the screw is swiveled another crosshead, which in turn carries two long fingers hooked at the end. Between these fingers is a movable wedge.

When a bearing is to be removed, the extractor is placed in position and the wedge and fingers inserted into the bushing as far as they will go; then the wedge is drawn up between the fingers until the hooks are tightened in the bushing. After this it is a simple matter to draw the bushing out by screwing up the nut on the main screw. The small extractor, capacity  $\frac{3}{4}$  to  $1\frac{1}{4}$  in., is sold at \$15, and the large capacity,  $1\frac{1}{2}$  to  $3\frac{1}{2}$  in., at \$18.

## Relio Many-Purpose Machine Tool

THIS machine has been brought out to meet the demand for a many-purpose machine tool. The construction follows conventional lines throughout and incorporates those features that are considered as good machine tool practice today. It will grind pistons, valves, wristpins, armatures, valve seat reamers, etc. Used as a turning lathe, it will regroove pistons, turn armature shafts, and a variety of straight and taper turning. It can also be used as an internal grinder for both straight and taper holes.

The work-head and the wheel-head of the Relio, as the machine is called, are driven from individual motors that can be plugged to an ordinary electric light socket. The drive for each is independent and the assembly is compact and rigid. The work-head and tail stock are mounted on a substantial table having the well-known "V" and flat type ways, and movement of table is effected by manually operating the rack and pinion device. The table is fitted with an adjustable stop.

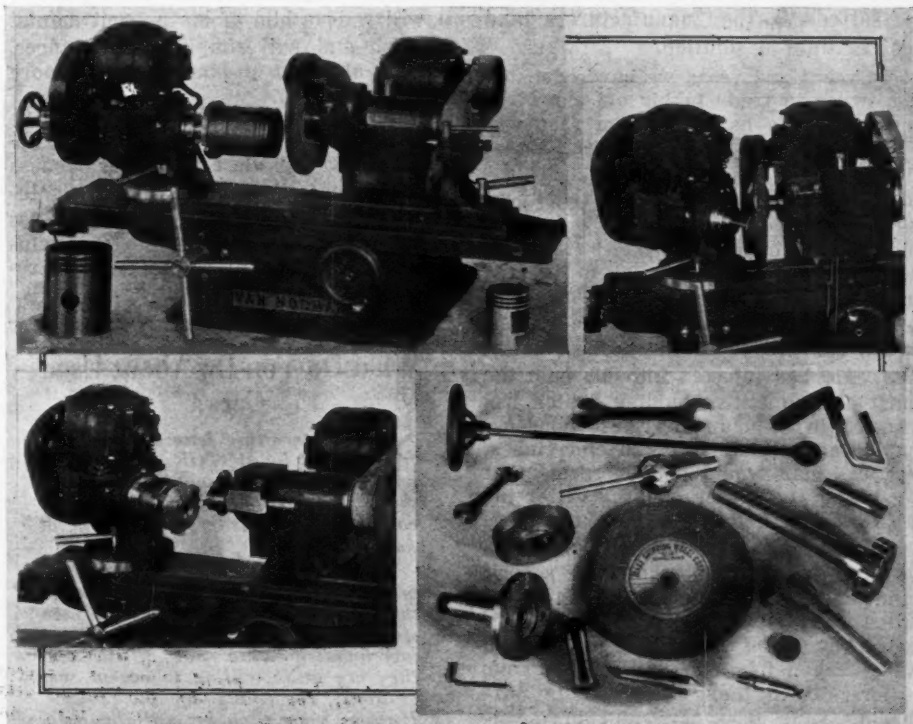
The work-head is provided with a graduated swivel base arranged with locating holes for 0-30-45 deg., and has a large diameter spindle with taper bearings and an adjustable means for take-up.

The spindle is adapted to receive a threaded collet shank with draw-in spindle. The motor is supported on the work-head and is connected to the spindle through reducing gears.

The motor for driving the wheel spindle is adjustably mounted on the cross slide and its belt connected to the wheel spindle. The wheel spindle runs in high grade ball bearings and has ample provision for lubrication by means of an oil reservoir which is cast in the wheel head.

Further specifications are as follows: work-head swing, 8 in. diam.; distance between centers, 12 in.; work-table travel,  $10\frac{1}{2}$  in.; draw-in collet capacity,  $\frac{3}{4}$  in.; bench space required, 3 by 4 ft.; size of motor: wheel-head,  $\frac{1}{4}$  hp.; work-head,  $\frac{1}{4}$  hp.; work-head speed, 170 r.p.m. high speed; 63 r.p.m. low speed; weight 330 lbs.; motor speed, 1700 r.p.m.; wheel spindle speed, 2800 r.p.m. Standard

equipment consists of one 8 in. by  $\frac{1}{2}$  in. abrasive wheel; one 1 by  $\frac{1}{4}$  in. abrasive wheel; internal wheel spindle nose; one  $\frac{3}{4}$  in. split collet; one collet draw-in spindle; one face plate; one piston adaptor plate and drawbar; one 45 deg. valve reseating reamer; one set of wrenches; one tool holder; one double valve reseater. Manufactured by the Van Norman Machine Tool Co., Springfield, Mass.



The Van Norman piston grinding machine. Upper left—machine set up for grinding pistons. Upper right—drive head shifted to accommodate machine for valve facing. Lower left—turning attachment for light lathe work. Lower right—regular equipment furnished with this machine

# How One Manufacturer Would SOLVE the USED CAR PROBLEM

*Here is suggested the organization of the National Used Car Co. to handle trade-ins. The National Automobile Chamber of Commerce is seeking the opinion of dealers on this very serious problem. What have you to offer?*

By H. H. BROOKS

*Sales Manager for Nordyke & Marmon. A paper read before the National Automobile Chamber of Commerce*

THE most serious problem confronting the automotive industry today is the used car. It is a problem that must be solved and solved quickly, but it will not be solved until both manufacturers and dealers get behind it in some kind of a concerted effort. We have all talked a great deal about it, we have theorized on the subject for some time, but we have never done anything about it. The time is now here for action, if we are going to prevent a demoralization of the merchandising end of our business.

Some time ago I saw hanging in an office in Indianapolis a sign reading: "A great deal has been said about the weather, but nothing has ever been done about it." When I read that sign it instantly reminded me of our used car problem. But the used car problem can be solved—if the manufacturers and dealers want a solution.

For years and years we have educated the owner to trade in his old car for a new one. We have told him that was the proper thing to do. Naturally, that is what the automobile-owning public now believes. It also believes that these cars should be traded in at big prices, and dealers have encouraged them in this opinion by allowing them inflated prices.

In many cases involving trade-ins, the owner has proved to be the best salesman. He has injected into his sale the spirit of competitive bidding, which has resulted in some of the most nonsensical things which you can imagine a business man would do. It seems that the larger the dealer and the better his reputation as a business man, the more foolish are the things he will sometimes do when it comes to trading in second hand cars. The losses that have resulted from such tactics are appalling, and these losses mean just that much money taken from the treasury of your dealers, which they would use in purchasing your new cars and in developing a market for your product. These losses, if permitted to continue, will eventually mean almost a complete change in the present retail merchandis-

ing organization, with a less efficient one, perhaps, succeeding it.

By reason of the used car, as it is handled today, we have an inefficient selling organization. You give the retail salesman to sell what you believe is the best automobile in its class that can be built, but you don't permit him to sell it entirely on its merits or on his enthusiasm for it, because the used car is injected into the transaction, thereby making the salesman a buyer as well as a seller. He may be a first-class salesman, but a very poor buyer. If we will eliminate the old car, which is today the fly in the ointment, and permit the salesman to concentrate his energies on selling the automobile, he will make a better job of the sale and will sell more automobiles at a greater profit.

If we can solve this problem, it will not only result in better retail selling, but the dealer can devote his entire time to the development of new car business; it will relieve him of his present mental anguish and will simplify his finances. It will also put production on a more stable basis.

I am not going to discuss further the pros and cons of the problem, as I am sure we are all alert to its seriousness and the necessity of arriving at a solution, if possible. I am going to suggest a plan, which, if followed to a conclusion I feel confident will eventually relieve us of this problem.

## What Do You Do About Used Cars?

*SOME interesting letters have been received by MOTOR AGE in connection with the present discussion of the USED CAR problem. The publication of these letters will begin at once.*

*What have you to offer? The best minds in industry are centered upon this question, at present. The men studying this phase of automotive merchandising are not selfish and they are quite willing to accept suggestions, regardless of the source. Perhaps your thoughts will be helpful. At least, they will receive consideration, if you send them to MOTOR AGE.*

New car dealers, if they are to conduct their business on a sound basis, must discontinue taking old cars in trade. The used car must be removed from the new car business, but at the same time an outlet must be provided for the used car. The dealer must discontinue the practice of taking old cars, because fundamentally it is unsound.

Now is a propitious time for the change. It must be a sudden rather than a gradual change. It must be a crusade. This will be the quickest and most effective way of educating both the public and our industry. It is going to require heroic methods and decisions. It's a stupendous undertaking, but the automobile industry is accustomed to great accomplishments and the solution of serious problems. A consideration of the plan I am about to suggest must not be brushed aside because of its magnitude nor the complexities which will at first occur to you, which later I feel will be eliminated, once the possibilities of the new merchandising scheme are realized.

## CORPORATION TO BUY, RECONDITION AND SELL USED CARS

I suggest that a corporation be formed and operated under the supervision of the manufacturers of passenger cars, the passenger car dealers and the bankers. The stock in this corporation will be offered to anyone desiring to purchase it, but it should be issued on a basis that will assure supervision as suggested. This corporation, I would suggest, be called the National Used Car Co., or some other appropriate name. The sole business of this corporation will be to buy, recondition and sell used cars. It will have a central headquarters with main branch houses located in various zones throughout the country. The number of zones would be dependent upon geographical conditions and potential markets. I estimate the required number of zones will be between twenty and thirty.

These main branch houses will be, in reality, reconditioning plants. I mention geographical conditions, because I think these reconditioning plants should be located at points easily accessible overland, so cars purchased can be



driven in instead of shipped. Within each zone there will be located as many sub-branches as necessary, these sub-branches, however, to be purely retail establishments, except the provision for minor repairs and adjustments be made for cars purchased which do not need painting or reconditioning. A great many of the cars purchased will be of this class.

The National Used Car Co. will be prepared to buy the old cars from those automobile owners purchasing new cars. The company will not be prepared to buy used cars from owners not purchasing new cars because of its method of financing.

Immediately upon the organization of the National Used Car Co., the dealers should stop trading in old cars, and I think they can be educated to this, as I am sure the large majority of dealers today would like to do so.

The manufacturer should encourage the dealer to discontinue the practice of taking in old cars, even to the point of demanding that he do so on the ground that it is poor business, as it impairs his efficiency and finances—100 per cent of which are needed in developing the new car business. Many of our dealers' contracts now require them to handle our cars exclusively, or our cars in conjunction only with certain other cars of a different class, which, we think, will not conflict with sound merchandising of our cars.

This is technically, perhaps, in restraint of trade, but it is not in unreasonable restraint of trade, and the legality of such provisions has never been questioned.

#### DEALING IN USED CARS NOT SOUND MERCHANDISING

**D**EALING in used cars by our dealers is not sound merchandising. Why, then, have we not the same right—each acting on his own judgment—to contract with our dealers against his practice? Why cannot such a provision in our practice be as reasonable and lawful as the present provisions just mentioned?

This attitude, however, should not be the result of any concerted effort or agreement on the part of the manufacturers. I believe each manufacturer can see the logic of such an arrangement and can be depended on to act accordingly on his own initiative and to induce his dealers to accept such a provision in the interest of his own business and the welfare of the industry upon which the dealer's prosperity depends, particularly, when, in the course of a short time, economic law will stamp it as an established policy in the industry. Education of the public and the dealer is one of the big essential elements of any plan.

When this is done, here is what will happen:

The customer comes to the dealer to purchase a new car with an old one to trade in. He asks the dealer for an allowance on the old car. The dealer explains that he is not taking old cars

in exchange for new ones, as he has no facilities for handling them, but that he has an arrangement with the National Used Car Co., by which he assists in financing any used car purchased by it, provided the owner purchases the make of car handled by the dealer. The dealer also explains to the customer that many other dealers in the same town have a similar arrangement, and he suggests that his customer take his old car to the National Used Car Co., where an expert used car man will appraise his car and make him an offer of purchase.

#### "CERTIFICATE OF VALUE" TO APPLY ON PURCHASE PRICE OF NEW CAR

**I**F he desires to accept the offer of purchase of the National Used Car Co. he will leave his car, accepting in return therefor a "certificate of value" for the amount agreed upon. This "certificate of value" will be good for the amount specified towards the purchase price of any new automobile made by a manufacturer cooperating in the plan. When this "certificate of value" is accepted by the new car dealer and the sale of the new car consummated, the National Used Car Co. will give the dealer in exchange for the "certificate of value" a negotiable note of equal value. This note can be endorsed by the dealer and used at his bank, as he has made of it two name paper. When the used car is sold, the note is to be redeemed instantly, and from this point the deal is to be financed entirely by the National Used Car Co. A successful operation of this plan will entirely finance the car inventory of the National Used Car Co.

Inasmuch as these cars will be purchased at the real market value and consequently sold at a profit, the National Used Car Co. will surely have considerable competition by other used car dealers. If the owner does not care to sell his car to the National Used Car Co., he will have the used car dealer to whom he can sell and, in addition, any individual prospect he may have for his car.

It will not be undesirable for the competitive used car dealer to purchase the car, as that will entirely relieve the new car dealer of financing the used car. This does not restrain trade in any manner, as the prospect has various channels through which he can sell his used car and there is no intention whatsoever of forcing the owner to sell his car at less than market value. Neither will there be any agreement entered into on the part of the manufacturers or the dealers collectively to force the operation of the plan. What is said in each instance by the manufacturer to the dealer will be simply an expression of the individual judgment of the manufacturer.

The National Used Car Co. will sell its cars at cost plus reconditioning, plus sales expense, plus a normal profit. A commission should be charged the dealer for the sale of the used car. This commission should be the same as paid the new car salesman. The new car

salesman will receive, as is customary today, a commission on the amount of cash received, and the National Used Car Co. will receive a commission on the balance involved when the used car is sold. Eventually the business of the National Used Car Co. will be on a profit-making basis.

Financing the invention, as proposed, will not, of course, be sufficient. A vast amount of additional capital will be required. I suggest this amount be raised in the following manner:

The manufacturers may subsidize the undertaking to the extent of one per cent of the net value of their products until such time as the company is on a sound financial basis and its stability and credit assured. In addition to this, it probably will be desirable to call on the dealers for funds, and I believe several million dollars can be secured from this source. On a basis of this year's production, exclusive of Ford, a one per cent contribution, I estimate, will amount annually to \$7,500,000. The basis on which this money is furnished will have to be determined, but any arrangement should not permit of control by any individual or set of individuals or companies. Fairness for every manufacturer and every dealer must be assured.

If any manufacturer's margin of profit prohibits the contribution of say one per cent, the dealer's discount can be reduced to this extent. In fact, I believe this can be easily accomplished by every manufacturer, as the dealer can well afford to do business on less discount if the used car evil is removed from his business. I have had dozens of dealers tell me this.

#### FACTORIES SHOULD COOPERATE WITH USED CAR CONCERN

**T**HE plan would also involve an advertising campaign which would extend to very large proportions, educating the public to this new way of purchasing.

All of the used car talent now distributed among the various dealer organizations can immediately be transferred to the National Used Car Company. The factories cooperating will furnish mechanics for reconditioning their own makes of cars. All factories should sell to the company parts at extreme distributor's discounts.

This new plan of merchandising will also permit an even distribution of used cars, as demand requires. For instance, if cars of one make are in demand in one section, and there is a supply in another section, they could be moved through the organization to the place where the demand was the greatest. Doing anything of this kind is practically out of the question now. The used car proposition at the present time is altogether a local one, so far as distribution is concerned. Cars taken in trade in one city must almost without exception be sold in that city. Under this new plan the way would be opened to interchange cars between one section and another.

Long delays in getting cars ready for resale would be avoided by reconditioning cars in the large central establish-

ments, manned by mechanics who know each kind of car intimately.

We all know that a great many cars are traded in, which should be consigned to the junk heap, but the dealers foolishly permit themselves to believe that the cars have a real value because they have allowed a real amount for them, and, as a consequence, they are held in stock with capital tied up in them which should be working in developing their new car business. When they are finally sold, it is an imposition on an unsuspecting purchaser, thereby creating a lack of confidence in used cars generally. Under this new plan these cars will be removed from the market.

There are many other advantages and I know there are objections to the plan. I know some of you will immediately think of objections. You may say it can't be done. I feel quite sure it can be done. Twenty years ago they called the automobile a new-fangled, impractical device; ten years ago they cranked cars by hand. The automobile industry is mighty big. It has vast resources, both

in money and brains, at its command. When it confronts a problem that must be solved, the automobile industry can solve it, no matter how gigantic the undertaking. This plan, I am sure, is feasible and can be accomplished. It is an idea that affects the vital workings of a mighty big industry.

#### PLAN WILL PROVE MONEY-MAKING ARRANGEMENT FOR DEALER

YOU may say that everyone may not stick to the plan. It is true—there may be some stragglers and they may interfere, but with the manufacturers behind the plan and the idea endorsed by the dealers and a big advertising campaign convincing the public that the proper method of buying used cars is from the National Used Car Company, there is going to be very little trouble in getting everybody to stick to the plan. It is a money-making arrangement for the dealer and he is going to be very foolish to try to buck the plan for a small immediate gain.

I believe the inauguration of this plan

will slow up new car sales for a short while. It probably will make people use their old cars longer, but it will cause these automobiles to be in use rather than on the dealer's second hand car floor, eating up his funds in interest charges, depreciation, etc. Most dealers have experienced enough of this and they would rather see a slowing-up in business for a while, if it will eventually put the used car on the market at its real value and relieve them of the financial loss they have been taking, so they can employ this capital in the promotion of their new car business.

The bankers with whom I have talked look with favor upon this plan. It will keep loans actively at work in the sale of new cars, eliminating the used car uncertainty, which is considered something of a liability, as heretofore it has had no fixed value. I also believe the new plan will instill in the public a confidence in the used car, which has heretofore been lacking, because the name of the manufacturer will be behind the car, which will be an assurance of value.

## What Is Happening to the Automobile Business?

By H. W. ACASON

President of the Acacon Motor Truck Co.  
(From the Timken Magazine)

WITH men out of work and factories working, some half time and some not at all, most everything in the world is blamed as being the cause—the European situation, freight rates, banks, tight money, taxes and the weather—everything from soup to nuts.

The real difficulty is something entirely different, and Detroit really needs to roll up its sleeves and take on some of the old-time pep that ten years ago startled the world and made the automobile business one of the largest industries.

My own experiences in Detroit during the past three or four weeks, trying to buy an automobile, will show what I mean, and is, I believe, the real answer to why business is no better. In each one of these experiences, I gave my name and business card, and was conceited enough to think that I might act, talk and look as well as the average prospective buyer.

#### Experience No. 1

I visited one of the largest buildings in Detroit, became quite enthused over a coupe exhibited on a wonderful floor in a magnificent showroom, talked for half an hour with a well-dressed salesman, told him I was interested, came back the same evening with my wife, and both looked at the car and both liked it. We asked to be allowed to ride in it, and the salesman promised to drive the car over to our home, which was ten blocks away, and give us a demonstration. This was three weeks ago, and I have heard nothing further from this salesman and I haven't been offered a demonstration. As far as the matter has gone, I might just as well never have gone in there.

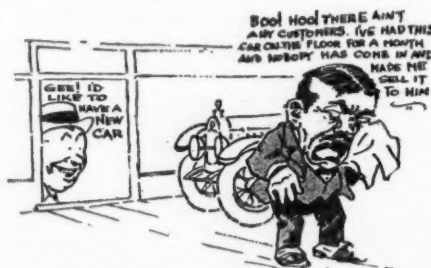
#### Experience No. 2

I answered an advertisement for a used coupe, went to see it twice and liked it, took my wife with me the third time

and drove the car, giving the salesman my business card and telephone number. This was over two weeks ago, and this same car is still being advertised in the papers, and I haven't even been followed up by telephone.

#### Experience No. 3

I owned a car of a well-known make and took it to the salesroom of the company that built this car right here in Detroit; they sold it for me for cash and gave me a check for the amount. No attempt, however, was made to sell me another car, although you would think that they would have been interested in keeping the money from the sale of my car and applying it against



another one. I have been in this particular salesroom three or four times since, and no attempt has at any time been made to sell me anything.

#### Experience No. 4

I made two calls about ten days ago at one of the largest retail automobile salesrooms here in Detroit and saw two different salesmen, and neither one of them knew the retail price of the cars which they had for sale, and each one had to go and get a book and look up the price before quoting me. Naturally, all my enthusiasm disappeared when handled by a salesman who didn't even

know the price of his goods. Both these salesmen have my name and address, but I haven't heard from them at all.

#### Experience No. 5

I saw a used coupe which I thought suited me and went to the salesroom to see it, and the salesman didn't even know that they had such a car for sale, let alone knowing where it was or showing it to me.

I finally ran into a man who apparently wanted to sell me something.

He had a car which he allowed me to drive as long as I wanted to, in order that I might see for myself how I liked it.

He has called me up every day for the past five or six days, and he has always sent the car over to my house in order to save me going to his place.

I bought this car this afternoon.

In view of business conditions at the present time, it is hardly believable that such experiences as above mentioned can be true, but they are the facts of my own experience, and I imagine that there are hundreds of other people in Detroit who could tell the same story, as, commenting on this situation to a number of friends, they have told me of similar experiences that they have had trying to buy a car.

It is mighty important to all of us that business take on a little pep, because we are all dependent on general business conditions, particularly right here in Detroit, where we used to show what enthusiasm, pep and hard work could do to keep the wheels turning.

Certainly the present business gloom should be no more difficult to fight than the opposition to the automobile which prevailed some 10 or 12 years ago. Right now, selling seems a lost art.

In short, what is needed is courtesy, tact, knowledge and initiative. There is a dormant market for cars of all prices, but it must be awakened, then interested, then convinced.



# Mr. Dealer *takes his* Pen in Hand

## Why a Mechanic Goes Bolshevik

FOR some time past I have been very interested in your articles in which "The Service Manager Speaks," and now to cap the climax you have run three articles, Sept. 8, "Need of Organization in Business," Sept. 15, "What Are You Doing for Your Employees?" and Sept. 22, "The Service Station Lacks Tone," which, in my belief, covers every dealer's organization in one point or another. I have been at this business over six years. I am a graduate of one of the largest automobile schools, as well as having taught in another.

From my experience I can tell you some of the many reasons why the owner goes to the independent garage for service instead of the dealer.

I belong to a service branch that is 30 miles from its home concern. There are ten of us under our service manager.

Our place is kept pretty clean, but junk, oh, my!—behind the benches, under them, in the corners, every place it is possible to hide it—and the showroom windows are spotless.

I have often noticed you say some men get paid for walking, not working. I belong in that class. We have 10 vises, five upstairs and five down. Usually the majority of us are working upstairs. What tool in a garage is used more than a vise? Perhaps a wrench, but no other. Two of the vises upstairs have no collar on the screw to cause the jaws to open—now isn't that handy? The third has the hardened jaws lost out of it (fancy trying to use that hunk of iron for a vise!) Not that a good vise is a hunk of junk.

I have told you already what I do: I walk.

Do you blame me?

Then we have a press, a largely advertised press, which has the maker's name on a brass plate and nice shiny green paint on it, but that's all. It's no press, it's only an excuse. The other day we had a cross member to rivet. It took two of us over an hour to go to everyone in the shop and ask, "Did you see the  $\frac{3}{8}$  rivet set? Have you seen the large C clamps?" and a thousand other questions.

Could not all these things which are only used occasionally be put in one place?

Would that cost a fortune?

Would it cost another fortune to fix a couple of vises, and droplights?

I hate to tell you about these; our standard joke is, "Go over to the Ford

service station and borrow one," which in reality would, no doubt, be true, if it were only convenient enough.

Every once in a while we get h— about the \$77 electric bill. "Don't use the elevator." We have the pleasure of carrying up and downstairs our tool boxes and whatever else has to go along with them, while the manager and salesmen will even wait for that slimy, slow, creeping gasterpod of the genius Helix to come down stairs and then ride up and down again! It is a funny thing to me. Are they made of different material from us grease hounds, or don't they think that our five senses were bestowed upon us by the same God which granted them theirs?

Another joke, the greatest of all—that "No Smoking" sign. Our bulletin board says "immediate dismissal." The gentle-



man customer first asks, "May I smoke?" and what does the big boss say? "Why, certainly; go right ahead." Is that what is supposed to be one of those figures in the drawing of each department, supporting its share of the weight of the building?

Now, the worst evil of all! As most of the fellows are married, settled down and care more for enjoying the pleasures of home after work than anything else, and our service manager is married and "tests" all the cars out himself, he accordingly hires some "friend" who will put him wise to the class in which he cares to associate most, while other men in the shop (one there about five and another three years) get from 10 to 12 cents less per hour than the friend, regardless of whether he is a good man or not. This well-paid expert, which we heard so much about, tries to use an easy-out in an electric drill, or tell us that graphite will ruin a silent chain in

less than a month, or tries to put a set of headlights on a car upside down and wonders why the taper won't fit on the inclined fenders.

Still, he is ideal because he is the boss' friend and the boss is a friend of the big boss and the big boss was a sponge salesman before he decided to sell cars! It is only through the high quality product that they represent that they get by, and even then we sometimes wonder "how do they do it?"

Do you really think with this kind of an organization that a man is justified in doing anything more than punching the clock? One time I cleaned up shop for two hours and was informed that I would not be paid for it, as my orders came from an "in-between" instead of from the boss himself.

Another time I went to start a car which was stalled in a nearby town. As we did not know the owner, they told me to collect, and I did. On my return I reported to the office and turned over the money, but had forgotten to get the order signed. The big boss said, "How do we know that's how much money the man gave you?" That was insinuating that I was a thief. Would the man's signature on the order have prevented me from knocking down on them if I had chosen to do so? If they distrusted me, why did they send me?

All these both minor and major nuisances tend to demoralize the workmen's regard for their employers, and in lots of ways you cannot blame them for "punching the clock," as that in reality is about all the consideration they get in some establishments.

Keep up your good work. I am going to run a shop some day—even if it only holds one car—and it will have a junk box, a drop light, a vise, a press, clean windows in the back, and absolutely no smiles unless they are sincere.—F. L. Brewer, Wilmington, Del.

Does the appearance of your place of business convey an impression of alert activity, or of slackness and indifference?

There is nothing like a coat of fresh paint to liven up a place and make it look more progressive and prosperous.

Recently an Indiana automobile dealer who had a gasoline pump in front of his place had the pump painted a bright red. (It had not been painted for years, and looked old and worthless before the painting was done). Right after the pump was painted he began selling a third again as much gasoline as he had been selling before it was painted!

Increase your business by putting on a new coat of paint!

## A Practical Analysis of

# North East Motor Generator, Model G, Used on Dodge Brothers Car

FROM FIRST PART OF 1917 TO THE PRESENT

*With Specially Prepared Diagrams That Are Easily Read and Understood*

By A. H. PACKER  
ARTICLE TWO

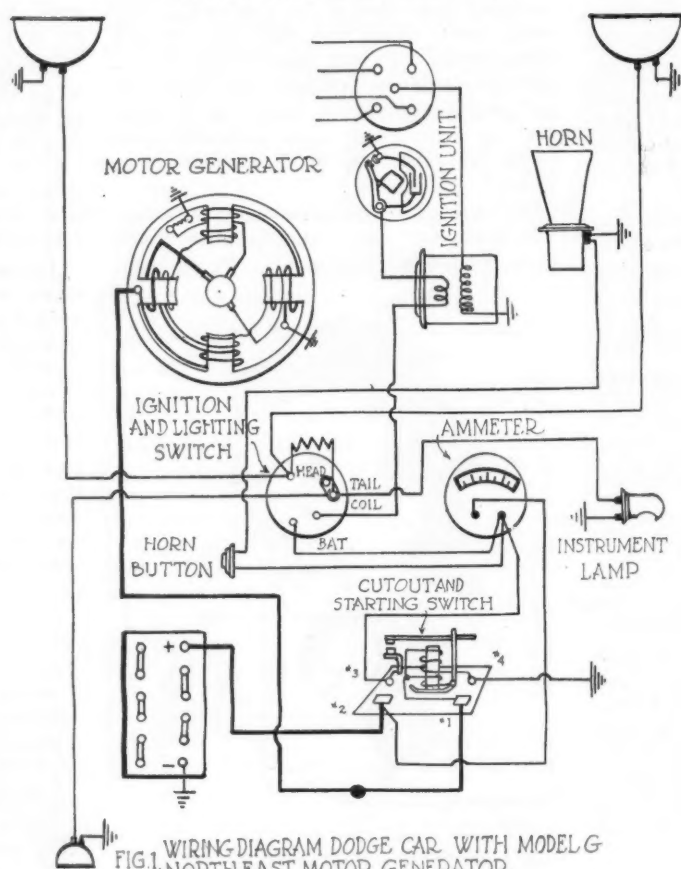
THE Electrical System supplied by the North East Electric Co., for use on Dodge cars, uses a 12-volt battery and 12-volt machine, which acts both as a motor for cranking the engine and as a generator for recharging the battery. This machine is known as a motor generator or starter generator. The electrical system also includes a combination starter switch and cutout switch, which first operates to connect the battery to the motor generator for starting, and later operates to connect the generator to the battery when a suitable speed has been obtained. The horn and ignition also operate on 12 volts, the same voltage operating the lights, with a resistance on the switch for dimming the headlights.

### Car Wiring

The various circuits on the car are shown in Fig. 1. Starter current flows from the plus terminal of the battery to No. 2 terminal of the starter switch and across to the No. 1 terminal when the pedal is operated. (This connection is made by means of a copper member not shown in the sketch, which shorts the two terminals together.) From the No. 1 terminal the current goes to the main terminal of the motor generator, then through two of the heavy or series field coils to the armature, then through the armature to the other main brush, and through the other two series field coils to a terminal that is grounded with a short metal strip.

Generator current flows from the main terminal to the No. 1 terminal of the starter switch, then through the fine or shunt winding of the cutout switch to the No. 4 terminal, which, being grounded, completes the circuit back to the generator. As the speed of the engine increases and the generator voltage rises, the current in the fine winding of the cutout becomes stronger and soon closes the cutout contacts, completing the charging circuit, from No. 3 terminal through the ammeter to the No. 2 terminal and from there to the positive battery.

Current for the lights goes from the plus battery terminal to No. 2 terminal on the starter switch, but does not go through this switch. Instead, the smaller wire carries it to the ammeter, then through to the lighting and ignition switch. When the lighting switch is operated, the current will flow to



the tail-light and through the dimmer resistance to the headlights, or in the bright position of the switch, directly to the headlights, the dimmer being shorted out by one of the switch blades. The operation of the ignition side of the switch, operated by the key, connects the battery and coil terminals, allowing current to flow through the ignition coil and the interrupter. Horn current is taken through the horn button from the same side of the ammeter that is connected to the lighting switch.

### Starter Trouble

When the starting motor refuses to crank the engine, the real nature of the difficulty can usually be determined by observing the action of the lights when the starter switch is pressed.

With the lights turned on, step on the starter button and see if the lights go out. If so, it usually indicates corroded battery terminal connections or a poor contact where the battery negative is grounded to the frame of the car. A low reading voltmeter, say 0-3 scale, can here be used to advantage connected across the connection that is suspected.

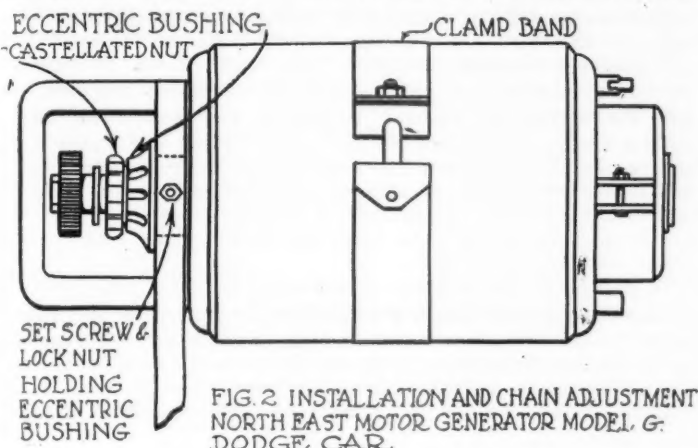
The starter button should then be operated, and if the voltmeter registers any appreciable voltage, it indicates a high resistance, due to the poor contact. This should be tried at both battery terminals, connection being made from the battery post to the terminal connected to it; also from the ground terminal with the frame of the car itself. Another way to detect poor connections is to keep the starter current flowing for about half a minute and then quickly touch the terminals to see if they are heating up appreciably, as this also locates the trouble.

If the lights remain bright when the button is pressed, it indicates an open circuit somewhere, and this can be located either with a voltmeter or a 12-volt portable test lamp connected from ground to various parts of the starter circuit. Test should first be made at the battery, then at the No. 2 terminal of the starter switch; then with the switch pressed at the No. 1 terminal of the starter switch and last at the motor generator terminal. If voltage, as indicated on the meter or on the lamp, is obtained all the way up to the motor,



it shows an open circuit in the motor generator, either due to brushes being worn down and not touching the commutator, or else due to a broken strap or connection. This can be determined when the motor is disassembled after removing it from the car.

If the lights are very dim when starter is operated, it shows either a poor battery, which can be checked with voltmeter readings at the different cells, or else it shows a short or ground in the motor. In checking the battery, the cells should all test about the same with starter current flowing. If one is very low, or shows a zero voltage or a reversed reading,



it indicates a bad cell, which means that the battery should be rebuilt or replaced. If all cells are very low, it may be that the battery is discharged, and a hydrometer reading should be taken, and if 1150 or lower, it indicates that this is the trouble. A high reading on the hydrometer, indicating a good battery, would indicate a short in the motor drawing an abnormal current. This could be checked by putting a high reading ammeter in the starter circuit, and if it indicated 160 amperes or more, it would again indicate a short or ground as the most likely cause of the trouble, this being further indicated if the engine can be easily cranked by hand.

If the lights dim but slightly, and but little current flows to the motor, it indicates the possibility of a poor connection in the motor itself, possibly where the main terminal stud is sweated into the heavy strap that goes to the series field.

### Generator Trouble

If the ammeter on the car fails to show charge, it is possible that the field fuse on the generator is blown out, but before replacing this an inspection should be made to see that the ground wire from the No. 4 terminal of the cutout is all right, as this wire is often forgotten and left disconnected, after mechanical work, such as valve grinding, has been done on the engine.

If the field fuse is all right, a voltmeter could be connected from the generator terminal to ground to see if any voltage is generated when the engine is running slowly. No voltage would indicate internal trouble requiring removal of the generator. If voltage is obtained, it should increase with increase in engine speed to about 15 volts, at which point the cutout should operate to connect the generator to the battery, and further increase in engine speed should not cause further increase in voltage. If the voltage continues to rise to, say 20 volts, it shows the cutout is not operating. Such a condition requires removal of the cutout switch, assuming that the wires to the cutout are all right, but the generator operation can be further checked, if desired, even if the cutout is not operating, by closing the starter switch with an ammeter connected in the circuit at the generator terminal.

Care should be taken in making this test, as it is possible to injure a low reading ammeter if the starter switch is operated with the engine standing. If the engine is run too fast when the ammeter is cut into the circuit, it is likely to blow the field fuse. The safest method is to use an ammeter mounted on a board, together with a heavy switch arranged to short out the meter, except when taking readings. The starter button is then pressed to crank the car, and the engine speeds up, the foot can be kept on the starter button, and the switch at the ammeter opened to get the true reading. As the ammeter will read something even with the shorting

switch closed, there is danger of forgetting to open the switch when checking the generator, with the result that the output will either be set too high or else the generator will be blamed for low output when there is nothing wrong with it.

### Testing the Cutout

If the cutout switch does not operate to connect the generator to the battery when all of the wires are properly connected, it is most likely that the shunt or fine winding is open. This can be tested with a 110-volt lamp line, so arranged that test points, when touched together, light the lamp. With these test points held on terminals No. 1 and No. 4, the lamp should light, due to current going through the shunt coil. Failure of the lamp to light would indicate an open circuit, which would account for the failure of the cutout to operate. A battery and low reading ammeter could also be used to test the shunt coil, failure to get a deflection of the ammeter needle indicating an open circuit. If the shunt winding is all right, a voltage of from 14 to 16 should cause the contacts to close, when applied across the No. 1 and No. 4 terminals. With 12 volts connected at terminals No. 1 and No. 4, the contacts should not close, and if they do, it shows the spring is too weak or the air gap too small and the switch when in service will open too late, drawing a bad arc at the points, causing them to burn. With the contacts held together a connection from No. 1 terminal to No. 3 terminal should be obtained.

### Removing Motor Generator

When it is necessary to remove the motor generator, there are a number of precautions to be observed. Referring to Fig. 2, it is necessary to remove the inspection cover on the front of the engine crankcase, which will show the sprocket and drive end of the motor generator, as seen in this sketch. The chain is not shown in this sketch.

Removal of the generator cannot be accomplished without first disconnecting the chain. The priming cocks should now be opened in all cylinders to relieve the compression, and the crank should be used to turn the engine over slowly. At the same time the chain should be watched carefully to find the link which permits removal of the chain from the sprocket. This removable link can be detected by the fact that there is at one side of it a locking wire, which has the same function as a cotter pin. Before removing this link, it is well to fasten a wire through the chain on both sides of the link and fasten the other end of the wire around the lamp bracket to keep the ends of the chain from falling down into the crankcase. With the link removed and clear of the sprocket, we are ready to proceed with removing the generator.

This requires loosening of the clamp band, and the removal of the castellated nut shown in Fig. 2. The thread is right hand, so that a drift or punch can be used, driving the top of the nut toward the engine. The nut cannot be taken all the way off at first, but will ride on the sprocket. It may then be possible to pull the motor generator straight backward and free of its supports. If so, the castellated nut should be caught as the generator is withdrawn, to keep it from falling into the crankcase. If the generator does not come easily, loosen the set screw and lock nut that hold the

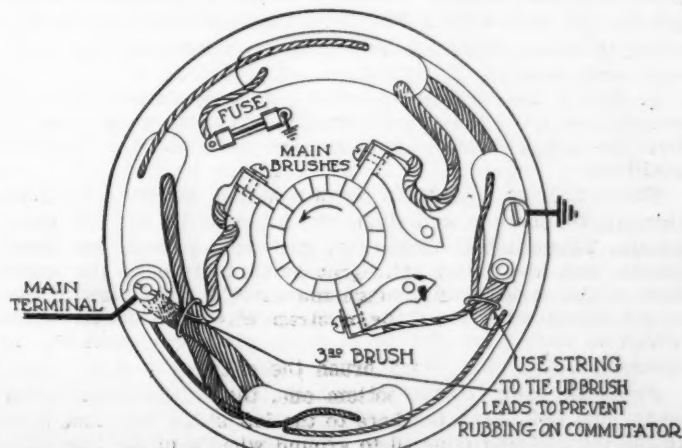


FIG. 4. NORTH EAST MOTOR GENERATOR MODEL G. USED ON DODGE CAR. VIEW FROM COMMUTATOR END

eccentric bushing and with a sharp cold chisel or screwdriver pry the eccentric bushing to the left. This will free the generator so that it can be lifted out.

#### Running Without the Motor Generator

On a car with chain-driven generator it has usually been considered impracticable to operate the car while the generator was being repaired, due to the fact that there was no way to support the chain, which would wind up in the engine if unsupported at the upper end. On the other hand, if the chain were removed, considerable work was involved

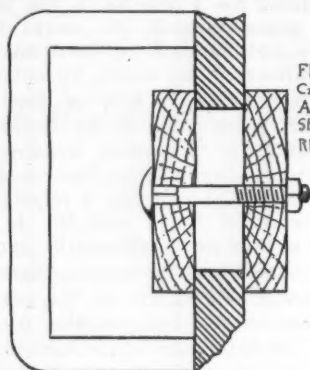


FIG. 3. WHEN RUNNING DODGE CAR, WITH GENERATOR REMOVED, APPLY BLOCKS OF WOOD AS SHOWN TO PREVENT OIL LEAKAGE. REPLACE INSPECTION COVER.

in replacing, and in some cases the front of the gearcase even had to be removed to replace the chain properly. An easy method of replacing the chain will be taken up farther along in this article, so the repairman need have no fear of removing it, if the customer desires the use of his car.

To remove the chain, the engine should be slowly cranked, and the wires used to keep the chain tight as it rolls over the sprocket.

To close up the opening where the generator has been removed, a couple of wooden blocks and a bolt should be used as shown in Fig. 3. The inspection cover can then be replaced, and the car is ready for temporary operation.

#### Disassembling Motor Generator

Removal of the end bracket requires a socket wrench with very thin walls, as the hex head is 17-32 in. across the flats, while the greatest outside diameter allowable is 11-16 in. Ordinary wrenches are too thick, but can be used if ground down.

In many cases it is not necessary to remove the armature from the pinion and bracket, and if this is the case, the armature and bracket can be removed together as soon as the four end nuts are removed with the special socket wrench.

When drawing the armature out, the third brush should be lifted with the thumb or finger so that it will not snap down off of the commutator, as the material of this brush is softer than that of the main brushes and the brush is likely to be cracked or broken if this precaution is not observed.

#### Testing Armatures and Fields

The armature can best be tested for grounds with a 110-volt lamp line and for shorts with a growler. The North East Co. puts out a growler that is very good for this purpose, and when testing for opens in the armature the same growler is used with a telephone receiver connected across adjacent bars, a fluttering noise instead of a steady buzz indicating an open in the armature.

In Fig. 4 the appearance of the field coil connections is shown, just as if the commutator and bracket were removed but the brush holders and brushes left in their natural positions.

Starting from the main terminal, the series field goes through the bottom coil, then the left coil to the left main brush. This winding should test free from grounds and from shorts with the shunt coil. The same is true of the other half of the series field that goes from the right main brush to the upper coil, then through the right coil to the terminal, which is later grounded by a strap when the generator is assembled.

From the lower or third brush the shunt field goes to the right field coil, then the bottom one, then the left one, then to the top coil and from there to the left side of the fuse clip, the circuit being completed to ground when a fuse is inserted.

The field winding on the four coils should draw 17 amperes on 12 volts.

#### Increasing Generator Output

If trouble has been encountered in getting enough charge to the battery, it is possible to improve conditions by installing a shorter third brush arm, which will move the third brush in a counter-clockwise direction, giving more voltage to the shunt field.

If reference is now made to Fig. 5, it will be observed that there are two screws that affect the output adjustment, the lower one being a locking screw and the upper one being connected to a little pinion that engages in a toothed sector carrying the third brush holder. As the adjusting screw with its pinion is turned clockwise, the third brush is moved counter-clockwise, but the amount of movement and therefore the output is frequently limited by the number of teeth in the sector. If a short third brush arm is not available, it is advisable to file another tooth in the sector so that the brush may be shifted farther in a counter-clockwise direction, and if the short arm is used, it is well to cut a tooth on the other side, as the change in brush holder arms sometimes gives too high an output.

In putting in new brushes or replacing old ones, care should be taken to get the black brush which has the most graphite in it in the third brush holder, and the yellowish brushes in the main brush holders, as the use of the black brush in the main brush holder will put a high resistance in the starter circuit, making it difficult for the starter to crank the engine.

The use of the low resistance or yellowish brush in the third brush holder will also give poor results, due to heavy local currents under this brush, as it rests on commutator segments that connect to coils generating a high voltage. While the motor generator is apart, the main terminal stud should be examined to see that it is securely sweated into the heavy lead to the series field, and before replacing the armature the brush leads shown in Fig. 4 should be tied up, as indicated, to prevent their falling down and rubbing on the commutator.

#### Turning Commutator

When it is necessary to turn down the commutator, the armature should be removed from the end bracket. The construction of this end of the machine is shown in Fig. 6, the bending up of the special lock washer and the removal of the pinion nut permitting the pinion to be pulled off, the oil slinger coming with the pinion. Removal of the screws that hold the retaining plate then permit the removal of the end bracket, after which the other parts can be removed, if desired.

Due to the high speed at which the armature turns, caused by the three to one reduction in the chain and sprocket drives, it is desirable that the commutator be perfectly true and turned concentric with the bearing centers. For this reason, it is recommended that when truing up commutators the armature should be turned on its own bearings instead of on the centers in the end of the shaft. Trouble due to an eccentric commutator can be detected when testing by operating at speeds up to 5000 r.p.m., at which speeds the output may cease and the generator refuse to charge, although at low and medium speeds it might be all right. The high speed

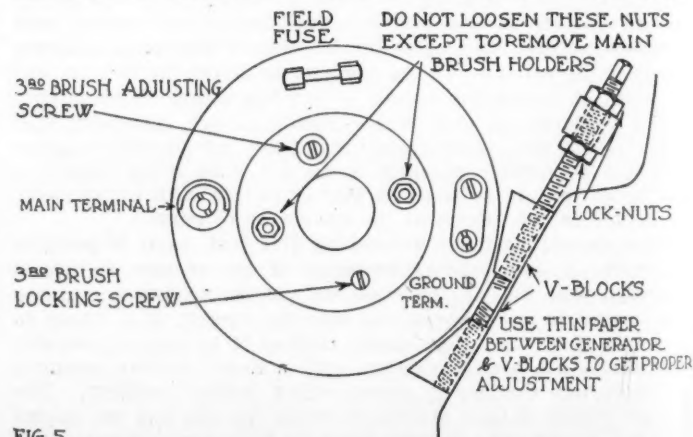


FIG. 5 V-BLOCKS AND 3RD BRUSH ADJUSTMENT MODEL G. NORTH EAST MOTOR GENERATOR.



test on a suitable test stand is therefore strongly recommended by the North East Co. When reassembling the pinion end of the generator, the cork washer should be examined to see that it fits snugly, so that oil will not work into the generator to any extent. Drain holes, however, are provided to take care of small amounts that may leak in.

### Reassembling Generator

When ready to replace the armature, be sure that the shunt field is connected to the fuse clip. This is often forgotten by even the best of mechanics in their endeavor to connect up the other leads that go to the brushes. The brush leads should, of course, be connected, but the screws should be left loose until the armature is in place to allow the brushes to seat on the commutator.

As the armature is pushed into place, the three brushes must be lifted, and this is most easily done by placing the generator upside down, holding two brushes with one hand and one with the other, and pushing the armature into place by pressing against it with the body as the machine is pulled toward you with both hands.

### Testing Motor Generator

Due to the fact that generators having third brush regulation are somewhat affected by battery voltage, it is necessary to take this into consideration in making the third brush setting. The following readings are therefore given, and the current output should be made to correspond to the voltage here given.

Amperes.	Volts.	R.P.M.
5.5	12	1800
6.0	13	1800
6.5	14	1800
7.0	15	1800
7.5	16	1800

The setting at 7.5 amperes is the one that is preferred, as this is the condition encountered when charging a battery that is in good condition and also well charged. The outputs given above are at the peak of the third brush curve, as at slower speeds the charging current drops off, and at higher speeds a gradual reduction is also observed, so that if the speed is not exactly known, the same settings can be made by observing the maximum output obtained as the speed is varied. To test the starting characteristics, the torque can be measured, this being between 26 and 30 lb. ft. with both motor generator and battery in good condition.

### Replacing Motor Generator on Car

Before replacing the generator, the chain should be replaced in the crankcase, this being most easily done by using a short piece of wire through the end links of the chain, as shown in Fig. 7. By reaching in with one hand the ends of the wire can be snapped over the edge of the crankshaft sprocket, and the engine can then be cranked slowly by hand. This will work the chain in under and over the top of the sprocket; as it comes over the top, the wire clip can be pulled loose and the end of the chain brought out to the opening at the inspection cover. The two ends of the chain should then be wired to the lamp bracket, as when removing the starter.

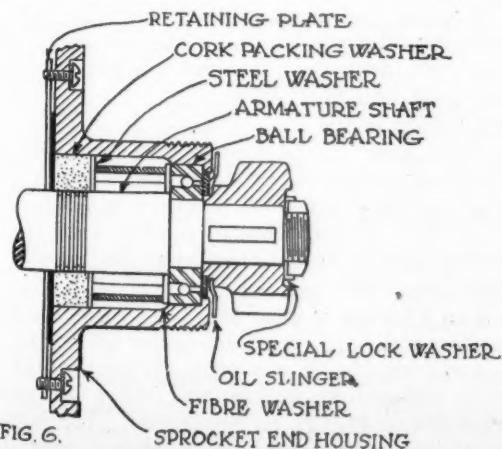
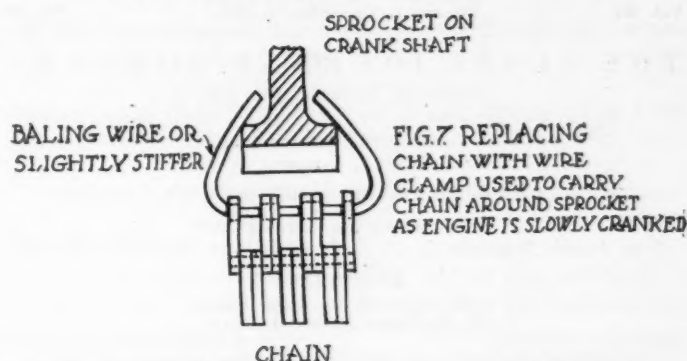


FIG. 6. ASSEMBLY DETAIL SPROCKET END, MODEL G, NORTH EAST MOTOR GENERATOR.

Reference should now be made to Fig. 5, which shows V-blocks used to support the motor generator. Before the machine is replaced, the two locknuts should be loosened, and the through bolt turned in such a direction as to cause the two V-blocks to move away from each other. After the generator is in place, they can be readjusted again so as to come just in contact with the machine.

The generator can now be put in place, and the eccentric bushing and castellated nut of Fig. 2 put in place. The eccentric bushing should be in such a position that the generator is at its lowest position, to give the chain as much slack as



possible. The chain can now be replaced on the sprocket and the connecting link inserted, the extra link replaced, and a fine piece of wire used through the holes in the pins.

The eccentric bushing should now be turned until the chain is tightened, so that with pressure at the middle it can be made to sag about 1-2 in. If the chain is looser than this, it is liable to injury from thrashing, and, if tighter, will be noisy in operation and will wear very rapidly. With the chain properly adjusted, the castellated nut can be tightened and the set screw and lock nut can also be screwed down, to prevent change in the adjustment.

### Adjusting V-Blocks

The V-blocks can best be adjusted by turning the through bolt so as to bring them toward one another, until a thin piece of paper inserted between the generator and the blocks is just pinched. This method should be used, as too light or too loose an adjustment of the V-blocks will throw the generator out of line and possibly strain the end brackets, cramping the armature. The clamp band can now be tightened, the inspection cover replaced and a test made to see that the electrical operation of the car is all right.

### Locating Ignition Trouble

If the engine refuses to start, due to having no spark at the spark plugs, the first thing to look at is the ammeter, for with the ignition switch turned on and the engine being cranked, it should show a reading flickering between about two amperes and zero, as the interrupter points make and break the circuit. If no reading is observed, there is apparently a break in the connection from the battery to the coil and through to the interrupter points, and its exact location can be found by the use of a 12-volt trouble lamp. If the ammeter shows a steady instead of a flickering discharge, it indicates that the interrupter points do not open, or that there is a ground between the coil and the points.

If the primary circuit is all right and the ammeter reading goes from zero to two amperes as the engine is cranked, the condenser should next be checked. To do this, disconnect the wire that leads to the coil and connect it to one terminal of a voltmeter. Connect the other voltmeter terminal to the coil terminal from which the wire was removed. Now see that the interrupter points are open, and turn on the ignition switch. If the voltmeter reads battery voltage, or even half of the battery voltage, it shows a shorted condenser, which should be replaced with a new one. If the interrupter points flash badly when operated with the finger, it shows an open condenser, which should also be replaced. With the primary circuit and the condenser in good condition, failure to obtain a good spark is practically always due to a defective coil, in which the spark is jumping through the paper insulation between layers of the winding. This condition requires a new coil. The next article will analyze the Delco Generator on the 1921 Buick 4.

# MOTOR AGE

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## Accepting a Dare

THE other day one of our readers, who conducts a very excellent service department for a car agency in a Southern city, wrote the following:

"When the automobile designers achieve complete inaccessibility, what will they do with it?"

"Dare you to answer?"

Of course, we immediately accepted the challenge and here is the answer:

Briefly it is this. MOTOR AGE, representing its largest clientele of dealers, is not going to permit automobile designers to achieve complete inaccessibility.

We are quite willing to admit that apparently a good many designers had this achievement in mind. Some of the cars that have been produced in the last few years nearly approached the standard set forth by the above note. One of these cars, which was riveted in nearly every place where a bolt should be, has been an extremely costly venture. Thousands of dollars have been spent in a sales campaign that accomplished nothing but a few first sales in some communities. No dealer has been willing to push this car, after he once understood his product. This car is now about ready to quit and its promoters have already consented to write off a very heavy loss.

This experience was brought about through self-respecting dealers refusing to sell a car that could not be serviced.

Through the pressure of dealers, and MOTOR AGE counts itself as a part of the dealer force, the factory service manager is being taken into counsel along with the pro-

duction manager, the service manager and engineer, in talking over designs about the new car.

Even the factory sales manager is learning that service is vital and important. We believe that MOTOR AGE has been a power in fighting for better service facilities and we believe that fighting in this regard has gained respect. One reason we believe this is the speech by Norval A. Hawkins, which was printed in MOTOR AGE last week.

In summing it up, we will say the challenge that was given to us would have been a much more serious challenge two years ago than it is today.



## Why Not Boost Service?

EVERYONE has noticed how a window displaying an electric washing machine in action attracts attention, or how a crowd gathers around a window containing any kind of moving exhibit.

There is a chance for the service station or repair department cashing in on this desire of the public to gaze upon something out of the ordinary. We know of one shop which built up a wonder business on cylinder re-grinding because it put the grinder right smack into a large window where it could be seen by passersby.

The grinder was in operation all the time, and any car owner who saw the precision with which the machine did its work and noticed the shining surfaces of the reground bores—if he had a car the engine of which was not functioning just right and which he suspected needed to have the bores trued up, with new pistons and rings—was quite sure to step inside and talk business.

Every dealer cannot and should not put a machine in his window, but we do believe that if the service department has purchased new equipment designed to facilitate service, it might profitably show this equipment in operation in a window and sell the car owners on the kind of equipment it has for the intelligent handling of maintenance work. The psychology of the thing is worth while, we think. Eventually, of course, such equipment will have to be relegated to the shop, where it belongs.

Those who made the shows two years ago will recall the popularity of the Marmon exhibit, wherein was featured an engine stand and special equipment. There is as good a reason why the dealer should boost his service in a window display, just as there is why he should put a new car in the window.



## Remember Christmas

WE ARE not, at this early date, going to wish you a "Merry Christmas." Of course, we do wish that for you, but better than just "wishing it," we are going to offer a suggestion as to how you can insure yourself a happy and prosperous Christmas. A part of this feeling should come from a sense of duty well done, as well as from the money that enables you to help those dependent upon you for happiness.

The suggestion is this:

Select from your stock—and if you have not suitable articles in stock, rush an order to the nearest jobber—and arrange a bright, cheerful, useful Christmas window. Go into this with all the spirit of a child who is dressing the Christmas tree at home. Get your boy or girl to help you. They know the spirit.

There is in Chicago a man who lives quite comfortably and makes a good part of his living by selling Christmas presents, and recently he has been giving a good deal of attention to automotive equipment. One Christmas he devoted his entire energy to spotlights. He sought out the wives of men who owned spotlight-less cars and sold them a spotlight as a Christmas present for their hus-



bands. This year, we have heard that he is selling heaters.

This is merely related as indicative of the possibilities of the line of "Ask 'Em to Buy." Get busy on the Christmas idea, and let the youngest member of the family be your chief adviser of the spirit and looks of your window. Let your merchandise be any worthy, comfort-making accessory or bit of equipment. This article should be as bright and pretty as possible and should be delivered in a holly box with some tissue paper and red ribbon accompanying.

Above all, never use the excellent spirit of Christmas as the occasion of unloading worthless merchandise. Such would be entirely out of keeping with the occasion.



### Flowers for the Living

ON another page of this issue of MOTOR AGE appears a Washington item which points out that Senator Townsend of Michigan is fighting a valiant battle on behalf of the automotive industry. In working for the end of taxes on automotive vehicles, he is doing something that will benefit every automotive and service dealer in the country. The success of his effort means better and more business.

Why not write to your friend, the Michigan senator, and wish him well in his fight for you and offer your assistance in any way you can help?



### A Greater and Better Clearing House

WE INVITE your attention this week to the "Clearing House" department of MOTOR AGE. This venerable—but, hale, hearty and up-to-the-minute—department is undergoing some improvements.

Through the changes in MOTOR AGE, "Clearing House" has always retained its identity and its popularity with the readers of this magazine. But problems are changing and the worthy "Clearing House" must meet them. Time was when this department found its usefulness in answering the questions from puzzled car owners. Then the service business became stabilized in one of the great and growing industries of the country and "Clearing House" was called upon to answer questions that puzzled some of the best mechanics in the business.

Today the requirements made upon the man who sells automotive service are exceedingly severe. Some of the cars that come to the service departments of the dealers throughout this country are 12 years old. This happens every day, as letters to the "Clearing House" will evidence. Some of the makers of these old cars have made from one to six new models each year since. Today there are 146 manufacturers on the list, each making from one to three models.

The service manager is expected to know all about all of these cars! He simply cannot know all of these facts, and in many cases instruction books cannot be obtained. So he comes to MOTOR AGE, and through our large, slowly accumulated library of instruction and technical books we help him over the rough spots. This we are able to do because we have experts in the translation of these instruction books, some of which require an expert to understand.

This is our idea of the "Clearing House," as it was recently operated. But its future is to be greater and better. We are adding to this Question and Answer department the solution of other problems that worry dealers. In this department we are going to answer such questions as may come to us from dealers that we think will be of interest to dealers generally. MOTOR AGE has answered many such questions. You are all familiar with the architectural answers by Tom Wilder; the legal

answers by Wellington Gustin, but many of you are not familiar with the other replies that have been sent direct by mail. So many of these will be helpful to many dealers that we are going to include them in our answers published—and all will be found in the "Clearing House."

We plan to make this department a "Clearing House" for dealer information as broad as this wonderful business in which we all are so vitally interested.



### We Must Read

THE revision of the teachings of the old style apprentice school have been beneficial. The old school was a valuable institution. The revised school is the old school with the added feature that now also the mind is trained. They seek to teach the how and why.

The introduction of the turret lathe and the automatic screw machine have reduced greatly the necessity for unusual manual skill in machine work production. But neither in the factory nor in the automobile maintenance station has there been any innovation that has eliminated the necessity for thought.

To think requires a certain amount of knowledge. Knowledge is nearly always acquired by observation, by the spoken word and by reading.

Those engaged in the sale and maintenance of automobiles are rarely so situated as to be able to attend school all of their lives. But to keep pace with the trend of the industry they must constantly add to their fund of knowledge. This they must do by observation and reading. The volume of knowledge obtained is dependent on how judiciously these two methods are blended.

Due to the inability of man to be physically at more than one place at a time, the knowledge acquired from actual observation is very limited. But if actual observation and practical experience are coupled with the actual observation of the remainder of the world, the amount of knowledge that can be acquired is practically unlimited. This is the advantage of reading or book knowledge. The text books of today offer a fund of knowledge to the man who has never had the advantage of attendance at a technical school. By careful reading he acquires the fundamentals of the art in which he is interested. The application of these fundamentals to the problems of the day are learned by reading. To keep pace with these problems and to show the trend of thought in that particular line is the mission of the weekly or monthly trade periodical.

The old prejudice against book learning is gradually disappearing and with it a lot of time worn, deeply grooved ruts.



### A Word About Accidents

IT was significant when the Yellow Taxi Cab Co. of Chicago printed advertisements asking the motor public to join with them in decreasing the number of traffic accidents in Chicago. It is still more significant when the same company announces that it will prosecute a touring car driver who, because of illegal speed of his car caused the death of a taxi passenger. The sorrow of this last announcement is that this man was a salesman for a Chicago dealer.

Of course, this man's employer did not suspect that his salesman was joyriding in his demonstration car, neither did he suspect that this man would drive 60 or more miles an hour. But it is time the motor car dealers of this country were employing salesmen of sufficient moral and mental calibre to be assured that they will not do these things. Traffic conditions and accidents are to a large extent preventable sales resistants.

# Faith In Future Is Guiding Industry

## Big Parts Orders Lead Way to Increased Car Output

### Growing Export Sales Taking Up Winter Slack—Factories Prepare for Show Business

NEW YORK, Nov. 29—While November production of motor cars undoubtedly will show a total less than for October, the business of parts and accessory manufacturers this month will hold close to the level of last. This somewhat paradoxical situation probably is due to the fact that car makers are replenishing their inventories in preparation for the business which will come with the New York and Chicago shows. In many instances they are preparing to bring out entirely new models or make improvements in the old lines.

The parts makers have been frankly surprised at the volume of orders this month. They looked for a lean 20 days and feared a long, hard winter. In many cases, sales the first third of the month fell off as expected, but after that there was a rapid and substantial increase both in releases and new business. Equally gratifying is the fact that many plants already have booked substantial orders for December.

While preparations for post-show sales are responsible for a part of these purchases of units and accessories, another factor has been the increase in foreign trade. There has been a distinct betterment in export sales this month, especially for the past fortnight, and as a consequence it is probable production for the last two weeks will exceed the first two. This business is beginning to take up the slack, or the final 10 per cent which means profits.

The position of the larger passenger car manufacturers in relation to inventories is steadily improving and every effort is being made to get them straightened out by the turn of the year. Many already have written off their losses. There is no disposition on the part of the stronger companies to evade their commitments with suppliers although they are asking price concessions.

It is becoming apparent that buying is less on a hand to mouth basis than it has been for some time. This bespeaks confidence in the future, but it means primarily a belief that prices of most of the materials which go into the manufacture of motor cars are as low as they will go for some time, at least. The stronger manufacturers have liquidated much of their past due merchandise indebtedness and are discounting current bills.

### FISHER BODY IN PRODUCTION

Cleveland, Nov. 30—What is generally regarded as one of the most important

developments of the year 1921 in the automobile industry here came when it was announced the last week in November that production had been started in the mammoth plant of the Fisher Body Ohio Co.

This mammoth plant, which is controlled by the General Motors Co., has been in course of construction for many months and it represents the expenditure of approximately \$10,000,000.

## Studebaker to Go Ahead at Full Speed After January 1

South Bend, Ind., Nov. 28—Orders to move ahead at full speed after Jan. 1 have been given to all plants of the Studebaker Corp. No effort will be made to push production in the meantime, for the company proposes to enter 1922 with no surplus cars and to have dealers in a similar position. The company will introduce in the near future two new models to supplant the present "special six" and the "big six" types. The little six, which was brought out a year ago, will be continued with slight improvements.

Enclosed cars are being turned out in larger volume, making possible quicker deliveries. Earlier in the season the company was several weeks behind on deliveries of enclosed cars to dealers. It is expected that approximately 12,000 cars will be delivered in the fourth quarter, making shipments for the year about 68,000.

### BIGELOW BUYS BOCK BEARING

Toledo, Nov. 26—The plant of the Bock Bearing Co. in this city has been purchased by H. W. Bigelow Jr., from the Standard Parts Co. He is understood to have purchased it as an investment, and negotiations are pending for the leasing of the property to some operating company. The plant formerly manufactured roller bearings for the Standard Parts Co., but has been idle for several months. It was one of the units which the Standard Parts Co. creditors and stockholders decided soon after the receivership to place on the market.

### NEW JORDAN DOUBLES PRODUCTION

Cleveland, Nov. 30—The announcement of the new Jordan Model has had the effect that the company management expected it would—it doubled the production at the plant at the season of the year when production generally falls off.

### ASKS BETHLEHEM SALE

Allentown, Pa., Nov. 26—Calvin E. Woods, receiver for the Bethlehem Motors Corp., will apply to the United States district court at Philadelphia on Nov. 28 for permission to sell the plant.

## Chrysler Car Is Blamed for Willys Corp. Receivership

### Debts May Reach \$14,000,000—N. J. Company Owns 30 Per Cent of Willys-Overland

TOLEDO, Nov. 26—Clement O. Mini-ger, president of the Electric Auto-Lite Corp., and Frank Kennison, vice-president of the Ohio Savings Bank & Trust Co., here, were appointed receivers for the Willys Corp. by Federal Judge John M. Killits late Friday afternoon. The appointment of receivers has also been ratified by the Federal courts in New Jersey and New York where plants of the company are located. John N. Willys is president of the corporation.

Officials of the Willys-Overland Co., here, announced that the proceeding did not affect that company in any way. The Willys Corp., however, owns practically one-third of the common stock of the Willys-Overland Co.

The action to appoint a receiver was brought by the Ohio Savings Bank & Trust Co. It is understood that the receivership is merely to preserve the property, and hold off a number of suits until the plans for reorganization now being formed by a group of banker creditors may be developed to a point where the refinancing of the corporation may be accomplished.

The Electric Auto-Lite Corp., here is one of the most successful of the plants owned by the corporation. It is said to be earning enough at the present time to pay all capital charges of the big holding company. The Willys Corp. also owns the New Process Gear Corp., Syracuse, N. Y., practically all of the stock of the United States Lighting & Heating Co., manufacturers of U. S. L. batteries, Niagara Falls, N. Y., and a large block of the stock in the Fisk Rubber Co.

The corporation recently completed at enormous cost its new plant at Elizabeth, N. J., and spent more than \$1,500,000 alone in the development of the Chrysler car which never got into production due to the business condition as it affected automobile manufacture. This is said to be the fundamental reason for the condition of the Willys Corp. at the present time.

The petition of the Toledo bank avers that the total indebtedness of the Willys Corporation is between \$10,000,000 and \$14,000,000.

The Willys Corp. was organized under the laws of Delaware with a capitalization of 5,000,000 shares of common stock of no par value, \$15,000,000 of 8 percent preferred stock and \$10,000,000 of 2 percent second preferred stock. Of this capital 4,450,000 of the common, 150,000 of the first preferred, and 77,000 shares of second preferred are outstanding.



# Won't Drop Excise Tax Revision

## Roads, Insurance, Traffic

### Engross Detroit A.A.A. Meet

### Affiliated Club Members Grow Warm on Subject of Association National Underwriting Bureau

DETROIT, Nov. 26—Resolutions recommending President Harding and Senator Townsend for their activity in behalf of Federal road legislation were adopted following a two-day conference of the Automobile Association of America held at the Hotel Tuller this week. The resolutions were forwarded to the executive committee of the association at Washington for immediate action, and it was further urged that these Federal officers and others be asked to use their efforts, looking to further Federal cooperation.

Other resolutions important to the American motoring fraternity which were adopted at the convention, espoused the financing of the association on the basis of 25 cents a member of each affiliated club; urged that the present road-marking system be replaced by a comprehensive system installed in each state under the approval of the Federal government; that the present basis of motor vehicle taxation is unfair in some cases, and that an investigation be undertaken to bring about a more equitable adjustment.

The conference went on record through resolution as considering the matter of motor vehicle insurance a local rather than national concern. It was recommended, however, that this subject be carefully investigated by national headquarters, and all affiliated clubs of the association be advised, as to the best methods employed by the most successful local clubs of handling insurance matters.

The insurance subject was one of the red hot features of the convention and the policy of the formation of a national insurance bureau under the auspices of the A. A. A. was frankly discussed. Opposition on the part of J. L. Haskin, of the Omaha Automobile Club, who favored the local handling of the problem rather than through national action, decided the convention toward favoring the resolutions finally adopted.

A study of standardization of traffic regulations was also recommended by resolution to the executive committee, and the making and carrying out of plans through its affiliated clubs and general membership, calculated to secure the adoption of such regulations by states and cities.

### STOP SIGNALS LEAD SALES

Philadelphia, Nov. 26—Electric stop signals are among the best selling items in automotive equipment stores and departments here this fall. Next come tire

valves and gages, in volume of sales. Low-priced stop signals that sell between \$1.50 and \$3, have been moving rapidly. The weather has not yet been severe enough to increase sales of anti-skid chains. A good business is expected in chains, however, since a standard line, selling previously no lower than \$5 for a 30 by 3½, now sells at \$3.35.

Tire dealers have been active here recently, despite price reductions. Lower prices have brought in some business that had awaited the cut, but the volume is not equal to that of the earlier fall. The general complaint here appears to be that manufacturers are making such long-wearing tires. It is apparent that numerous small dealers will be shaken out and abandon the business before next spring, as a result of the increasing use of cord tires.

## Hearne Wins Thanksgiving Day Race at Beverly Hills

Los Angeles, Calif., Nov. 24—Eddie Hearne won the annual 250-mile Thanksgiving automobile mile race here today on the Beverly Hills speedway in 2:15:55. Tommy Milton, who finished second, took the lead in the contest for the national championship. Milton, in the national contest, stands at 1970 against the 1945 points of Sarles.

After the race today it was announced that another race under A. A. A. sanction would be run at the Cotati speedway Dec. 11, at which a credit of 500 points will be awarded.

In the race today Sarles was forced out on the 130th lap. Frank Elliott finished third, Jimmy Murphy was fourth, Harry Hartz fifth, and Eddie Miller sixth.

## Gotham Used Car Show Eases Tension In Crowded Market

New York, Nov. 28—An average of 1,000 prospects a day visited the Used Car Show held in the 12th Infantry Armory here this week under the auspices of the New York Dealers Assn. and actually paid admission to look at the cars.

Up to Friday night more than 200 cars had been sold on the floor and, while this is probably but a small proportion of the used car stocks of the dealers, it has relieved the situation to some extent. In addition to the sale of these cars, the show has awakened interest in used cars through the favorable publicity given the show and the cars during the week in the local newspapers.

The Used Car Show followed the Enclosed Car Show, which occupied the armory all of last week. Under the rules of the show committee only cars that had been thoroughly overhauled and guaranteed by the dealers were allowed on the floor.

## Senator Townsend Will Take Tax Fight to Next Congress

### Is Disappointed Over Measure Containing Excise Levies; Hopes for Relief

WASHINGTON, Nov. 26—Senator Townsend of Michigan told MOTOR AGE today that he intended to carry the fight for the removal of the excise tax on automobiles into the next session. The passage of the tax measure retaining the excise tax on automobiles and trucks was a keen disappointment to the Michigan senator, who had waged an aggressive though unsuccessful battle against it. He is firmly convinced that it will be necessary within the next year to revise the tax bill as it passed congress, because of its inequities.

With price reductions common throughout the industry on virtually all makes of cars and trucks, the tax item is an important factor in the situation. Senator Townsend feels that the conference on the limitation of armaments will have much to do with the removal of the excise tax. This belief is founded upon the fact that the larger proportion of the annual Federal appropriations are used in the maintenance of the military and naval establishments. The reduction of naval forces and the suspension of battleship construction would effect enormous saving in expenditures and, as a consequence, would reduce the need for taxes.

Senator Townsend is of the opinion that the economies resulting from this international action will lessen the opposition to the removal of the excise tax. In his efforts to have the tax removed at the special session, he found that the principal opposition was to the elimination of this revenue.

### REPUBLIC REFINANCES

New York, Nov. 26—The Republic Motor Truck Co. has completed arrangements for the deposit and extension of \$2,500,000 seven per cent mortgage notes outstanding by which the corporation would increase the rate of eight per cent and agree to redeem \$300,000 worth of the notes annually, beginning Nov. 1, 1923. Noteholders who agree to the extension will have opportunity to subscribe for common stock at \$8 a share to the extent of 10 shares for each \$1000 note.

### DEERE & CO. ADDS TO FORCE

Moline, Ill., Nov. 25—Deere & Co. today added small crews to their present working force, establishing a three-day-a-week shift, giving favor to old employees. The new force, it was said, is no indication that Deere & Co. is opening up in a big way, but merely to handle some immediate work.

## Parts Service Stations Is Plan of New Detroit Concern

### 280 Stations with Uniform Prices to Be Placed in Leading Cities

DETROIT, Nov. 28—The inauguration of a combined parts service plan by leading parts makers will be made soon after the first of the year. Preliminaries are nearing completion and definite steps have been taken looking to the location of service stations in all leading cities. Uniting in the plan will be one manufacturer of each unit entering into the construction of an automobile. A second maker in a line can enter only with the consent of the first maker.

The cost of maintaining the stations will be proportionate to the business done. The plan is to provide genuine parts for all replacements and to provide them with the least possible delay. Stations and substations will be located so that any part may be obtained in not more than six hours anywhere.

Two hundred and eighty stations are now planned. Complete stocks will be carried; prices will be fixed by the factories and will be uniform in all sections excepting for the differences in freight charges. A force of field men will be maintained to keep up stocks and high service standards.

### HOYT WITH FRANKLIN SALES

Syracuse, N. Y., Nov. 26—Gaylord A. Hoyt has been appointed assistant sales manager of the Franklin Automobile Co., succeeding Ernest P. Johnson, who takes a position with the Charles G. Hanna Co., local Ford distributor.

### PREDICTS 50,000 OVERLANDS IN 1922

Toledo, Nov. 26—John N. Willys has announced after an inspection of the Willys-Overland plant here that he believes the company will be able to furnish employment to 12,000 men next year and that more than 50,000 cars will be required to meet the needs of Willys-Overland dealers in 1922.

### MID-WEST INSURANCE PLANS

Chicago, Nov. 26—Chicago representatives of eastern underwriters who handle automobile insurance are watching with interest the apparent deadlock of the

eastern automobile underwriters' conference committee on the use of the three-quarter value clause in the writing of automobile insurance.

Chicago men have been among the first to recognize the gravity of the automobile insurance tangle. They say that because of the comparatively short time during which this kind of insurance has been written the insurance men are sailing an uncharted sea and have had to change their practices in the light of their experiences. Increasing thefts and frauds of many kinds have added to the difficulties. Chicago underwriters have made fair progress toward clearing up the situation, and it is thought here that the committee of ten may find help in the manner in which business is conducted in the mid-west.

### TO ADDRESS TRUCK SALES

Washington, Nov. 26—Gordon Lee, chief of the Automotive Division, Bureau of Foreign and Domestic Commerce, Department of Commerce, will tell the National Association of Motor Truck Sales Managers in Detroit, Dec. 2, just what the government is doing to promote interest in the automotive industry. He will appear as a special representative of Secretary of Commerce Hoover and will deliver an address at the cabinet officer's request.

### BALTIMORE SHOW JAN. 21-28

Baltimore, Nov. 25—The annual automobile show will be held here in the Fifth Regiment Armory, Jan. 21-28. The following names represent the show committee: A. H. Bishop, E. R. Meyers, E. T. Backus, W. F. Kneip, Louis Fox, Thomas G. Young, A. S. Zell, Clyde Loose and John E. Raine, manager.

### OWEN SALE SET ASIDE

Wilmington, Del., Nov. 26—In United States court here Judge Morris has set aside the sale of personal property of the Owen Magnetic Motor Co. of Wilkes-Barre and ordered a new sale. The ground was taken that the court's order was not complied with and that the price was inadequate.

### CASE LOWERS PRICE

Racine, Wis., Nov. 25—The J. I. Case Threshing Machine Co. announces a price reduction on its four and seven-passenger cars from \$2250 to \$1935 and on its sedan from \$3285 to \$2970.

## Missouri to Force Signaling Devices on Enclosed Cars

### Prosecutor Oakley Names 22 Signals That Meet Requirements in St. Louis

ST. LOUIS, Nov. 29—The police commissioner last week decided that the law requiring certain motor cars operated in this state to use signaling devices would be enforced Dec. 2, owing to difficulties that had arisen in providing cars with the necessary equipment. As routine, this law would have become effective Nov. 2. A series of delays have been announced.

Prosecuting Attorney Oakley of St. Louis notified the police department that the cars which come within the meaning of the law and which must be equipped with signaling devices are:

A—All enclosed cars, including sedans, cabriolets, coupes and broughams.

B—All cars that by reason of curtains being in position become enclosed cars.

C—All trucks so constructed that the hand and arm signals cannot be given so as to be plainly visible from the rear, or that by reason of their cab curtains being in position become enclosed cars.

Oakley has submitted a list of 22 devices as being within the law.

The various signals that have been approved by Oakley are as follows:

Automobile Signal and Traffic Indicator, Auto Indicator, Beacon Light, Melie, Ped Automatic, Pollech Light, Tel-Rite, Victory Self-acting Stop, Fireball, Globe, Green Brothers, Guardian Light, Kepple Brothers, Kobzy, Mac-Turn, Neo-Lite, Protex, Shapleigh Special, Simmons, Singer's, Star Light, S. C. K. and Thullen.

The secretary of state's list has not yet been announced.

### SPECIAL FOR NEW YORK SHOW

Chicago, Nov. 26—The Chicago Automobile Trade Assn. will conduct a special party of members to the New York show. Several special cars have been reserved on the Twentieth Century. The party will leave Chicago Jan. 9 and will be quartered at the Commodore.

## Group of Earl Motors, Inc., Distributors Who Met in





## Lincoln Resumes Production After Physical Inventory

**Prospects Are That Assets of Company Will Be Sold on Bids of Present Company Interests**

DETROIT, Nov. 29—Manufacture of cars has been resumed at the plant of the Lincoln Motor Co. by the Detroit Trust Co., the receiver, upon completion of the physical inventory. Shipments for the month of November are expected to run about 100 cars, and operations, pending final reorganization, will be conducted strictly on a sales basis. Details of the inventory are not available. The work of pricing the equipment and material at figures which the receiver considers fair is now in progress. An announcement on this subject is expected within a week.

There are several important points upon which reorganization plans hinge. One of them is a question of taxation, which the receiver and attorneys for the company have taken up with the Federal government at Washington and which is now under consideration.

Operations at the plant for the present will consist mainly of completion of cars which were in process at the time the receivership action was taken and which were held up pending the inventory. Dealers and distributors are placing orders, and the receiver reports approximately 100 sales since the court action was taken.

A stockholders' protective committee has been formed by the owners of class A stock and steps now are being taken for the organization of a merchandise creditors' committee.

There has been much speculation as to the nature of the reorganization which is contemplated, but definite information on this subject is lacking. It is considered possible that the assets will be offered for sale and bid in by the interests now in control of the company.

### CHICAGO TERRITORY SALES

Chicago, Nov. 30—Business conditions in the automobile industry in the Chicago territory, including the northern half of Illinois and a section of Indiana, Michigan, Iowa and Wisconsin, vary widely. In some localities in Illinois

sales are poor, while in others business is good. These conditions are dependent upon the banks. Some of the banks seem to have plenty of money and are willing to back the dealers. Banks in the small villages seem to be loaded up with paper and are not in a position to finance farmers, no matter how well secured they may be.

In the north end of Illinois, where dairying is the chief industry, conditions are unusually good. City conditions are especially encouraging. Country conditions are spotty and are dependent upon the nature of the farming being done. There are many instances where dealers are entirely sold out, while others have a number of used cars on hand.

## Van Briggle Heads Draw Federal Court Sentences

Indianapolis, Nov. 26—L. H. Van Briggle, former president of the Van Briggle Motor Devices Co., and Henry Rominger, former treasurer of the company, have been sentenced to Federal prison for four years and 18 months, respectively, by Judge A. B. Anderson of the Federal court. Besides this, Van Briggle is to pay a fine of \$1000 and Rominger \$500.

Proceedings in the court took a dramatic turn when Van Briggle asserted that all members of the board of directors were equally guilty.

Judge Anderson said he could not see how other members of the board of directors could be innocent in view of the evidence presented by District Attorney Van Nuys, and by the pleas of guilty entered by Van Briggle and Rominger to the charges of using the mails in a scheme of defraud. Judge Anderson said: "If others are guilty, there will be another grand jury to investigate their connection with the affairs of the Van Briggle company."

The directors were named in the case particularly in reference to a 10 per cent dividend declared on the stock of the Van Briggle company at a time when it was known, as shown by evidence, that the company was not making money.

### MILBURN HAS ELECTRIC TRUCK

Toledo, Nov. 26—The Milburn Wagon Co. has announced that it soon will place on the market a new model electric truck. More men are being added to the working force of the company.

## Steady Development Without Radical Change GMC Program

**Corporation Realizes Day of "Easy Sales" Is Gone and Prepares for Future Struggle**

NEW YORK, Nov. 29—General Motors Corp. has in prospect no radical or sensational plans, notwithstanding sundry reports to the contrary. The corporation will move along in the next year much as it has in the past, making gradual improvements in its lines, fully prepared for the era of keen competition upon which the industry has entered.

It can be stated positively that none of the divisions of the corporation will be discontinued in 1922 with the exception of Scripps-Booth. Notice of the dissolution of this company has been filed at Albany, but it is understood the factory will not be sold. Announcement as to the uses to which it will be put is expected within 30 days.

The aircooled development will be continued, but showing or marketing at an early date is not to be expected, as the work is still in the experimental stage and the General Motors Corp. policy is against production until exhaustive tests have been made and the corporation is assured that the product for which it must necessarily stand sponsor is everything that might be desired.

The General Motors Corp. realizes fully that the era of "easy sales" has gone, probably never to return. They are urging constantly the necessity of intensive and intelligent selling efforts. They insist that the salesman must go to the prospect and not wait for the potential purchaser to come to him.

As a corollary of successful salesmanship, they contend there must be efficient servicing so that a motor car user who once buys a General Motors product never will stray from the field. Hooked up closely with sales and service is a determination to give full value for every dollar paid for any of the General Motors models. The prices of the corporation's lines have followed closely the downward trend of materials, taking into consideration also the lower cost and greater efficiency of labor.

## Two-day Convention at the Factory in Jackson, Mich., Recently



## Bargain Sales Start for Car Buyers in Birmingham

**Denegre Motor Co. Offers New Lexingtons, Briscoes and Allens at Steep Reductions**

**B**IRMINGHAM, Ala., Nov. 26—A departure from the usual methods employed in automobile merchandising is the plan just inaugurated by the Denegre Motor Co. of Birmingham. The plan is to sell new motor cars at prices considerably under the regular quotations for the machines by regular dealers. All classes and makes of cars are to be handled. No second-hand cars will be offered.

"Our territory is the United States," declare the managers of the company. "We will seek bargains in new cars all over the country and sell them at prices that will be sensational. Many different makes will be handled, providing an opportunity for the buyer to select a car of his choice at a substantial reduction in price."

Reasonable terms will be made on the cars, but no second-hand machines will be accepted in part payment, according to the management.

Some of the prices quoted this week for new automobiles delivered in Birmingham with war tax and freight paid, were as follows:

New machines, regular price \$2050, at \$1695.

New machines, regular price \$1085, at \$745.

New machines, regular price \$1250, at \$895.

New machines, regular price \$1400, at \$995.

The above cars include Lexingtons, Briscoes and Allens. All are 1921 models and all are brand new.

The aim of the concern is to buy and sell new automobiles at bargain prices. They are using large advertisements in the local newspapers, and indications are that the methods will prove popular with the public, although the bargain sale plan has just been put into effect and results cannot yet be determined.

### \$10,000,000 FOR GOTHAM BUSES

New York, Nov. 26—Mayor Hylan announced at a conference of city department heads, called to consider amendments to existing laws to be presented at the next session of the state legislature, that the city would ask the legislature again for authority to operate buses. "We are prepared to spend \$10,000,000 in the purchase of well-lighted, comfortable and well-ventilated buses," he said.

### ARRESTS MADE IN REVERE TANGLE

Logansport, Ind., Nov. 26—Luther M. Rankin and Francis A. Reilly, said to have been members of the Revere Motor Sales Corp., were arrested here Nov. 14, charged with conspiracy to commit a felony in indictments returned by the

Cass county grand jury. Bonds to the sum of \$5,000 were filed.

The Revere Motor Sales Corp. purported to be an eastern syndicate, which was to absorb the Revere output at a guaranteed profit of \$500 on each car. Newton Van Zandt at that time was president of the Revere Motor Car Co. In interviews given out at the time he did not indicate that he had any connection with the sales company.

Both Rankin and Reilly are connected with the Duesenberg Automobile & Motor Co. of Indianapolis. Rankin is vice-president and general manager and Reilly is treasurer of the firm.

## Star-gazer Guides Lexington Show

**CHICAGO, Nov. 26—***Horoscopes for guests were one of the features introduced by O. T. Mitchell, president of the Lexington-Chicago Co., last week during the company's observance of Fall Festival and Enclosed Car Week. To the tunes rendered by a stringed orchestra in an autumnal setting of richest colors, Mrs. Maude Lindon, vice-president of American Astrological Assn., cast the horoscopes of prospects and many of them found striking evidence of Lexington's excellence in the messages from the stars.*

## Offers New Plan to Curb Stealing of Automobiles

Hamilton, O., Nov. 28—A plan to prevent the theft of automobiles has been put on a working basis here by the incorporation and organization of the Co-operative Auto Theft Suppression Co.

The idea is to link the police, merchant and automobile owner in an effort to run down car thieves.

Officers of the company believe that the reward of \$250 offered for the arrest and conviction of a thief, will stimulate activity of police authorities. Cars of members will be designated by the company emblem, and a secret number; and, when it is stolen, police departments of various states, brother members, and private detective organizations will be notified.

When joining the company the member will pay \$7.50, and in return will receive a book of coupons, each coupon entitling him to a discount of 5 cents on the dollar in stores that are also members. The plan for merchants is largely rotarian, only one or two in the same line of business to the county being permitted, and there is a separate coupon book and list of merchants for each county.

The plan works out like this:

The company retains the initial payment of \$7.50.

The member, in addition to getting protection for his automobile, may get his discount: if he buys a tire, say for \$20, he gives the dealer \$19 in cash and 20 coupons, each coupon representing 5 cents. He must pay cash and there is no discount on less than a dollar.

## Fall Tractor Sales Pick Up in Southeast Over 1920

**Industrial Placements Have Been Unusually Good — Florida to Front in Reclamation Equipment**

**A**TLANTA, Ga., Nov. 26—Tractor sales in the southeast during October and November were materially better than the same two months in 1920, according to factory branch managers in the Atlanta territory. In east Tennessee sales have been unusually good all summer because of the fact that agriculture is more diversified in that section than anywhere else in the southeast, and the farmers therefore are more prosperous. In Georgia and North Carolina industrial sales have been unusually good, as these two states lead the southeast in road construction work now in progress.

Thousands of acres of swamp lands in Florida are being reclaimed this fall and tractors are being largely purchased for this work in the southern part of the state. Alabama sales have increased materially the past two months, due to the fact that crop diversification was more widely practiced in that state this year than ever before. South Carolina is the only state of the section where sales are far below normal because of poor cotton and tobacco crops this year. The outlook for winter business is many times better than it was at this time last year.

### INDIANA DURANT ORGANIZATION

New York, Nov. 29—The organization of the Durant Motor Car Co. of Indiana has been completed by the election of Hal W. Alger of Chicago as first vice-president in charge of sales and A. Henniger, who has been a member of the T. W. Warner organization, as second vice-president in charge of production. The other officers are: president, W. R. Willett; secretary, H. M. Hebermann; treasurer, C. F. Daly. Besides the officers, the directors include T. W. Warner as chairman of the board, W. C. Durant and C. O. Miniger.

### GROOMED CAR CONTEST

Amarillo, Tex., Nov. 25—Amarillo Pan-handle Automotive Assn. has started another campaign by which it is hoped interest in individual automobiles and the accessory and repair business will be stimulated. The association is giving prizes to the amount of \$100 to owners of the best looking, best kept and best running cars appearing in a parade which will be staged through the business district of the city.

### EXIDE DISTRIBUTORS MEET

Atlanta, Ga., Nov. 25—The fifth annual convention of the southern distributors of Exide batteries was held in Atlanta recently, about 50 distributors attending from the eight southeastern states. Charles W. Bell, manager of the Atlanta branch, was in charge.



## Serviced Army Trucks Cut to Fit Road Makers' Needs

### State Highway Departments Forced to Great Expense to Convert Vehicles Into Use

WASHINGTON, Nov. 25—There has been considerable discussion in automobile trade circles as to the final disposal of surplus motor vehicles turned over to the Bureau of Public Roads from the War Department. In the dispute as to legislative action in disposing of this material, either by sales to the public or transfer to the Department of Agriculture for use on highways, the industry has generally taken the position that it would be best to distribute it immediately. This attitude was taken under the assumption that the quick absorption of surplus vehicles by the state highway departments would hasten the demand for replacement with new devices of vehicles and thus increase the sales of private manufacturers and dealers.

The Bureau of Public Roads has been quite discriminatory in the selection of motor vehicles. Approximately 30,000 machines, both trucks and automobiles, have been transferred to the various state highway departments. In addition, the Bureau of Public Roads took over from the War Department the spare parts to the value of \$12,000,000. The engineers connected with state highway organizations found it necessary to convert the motor vehicles, in order to make them serviceable in their new field. Great ingenuity on the part of the engineers was disclosed in the results obtained.

The motor trucks, of which over 22,000 have been transferred, were generally not suitable for road construction purposes, on account of the shape and size of their bodies which were designed especially for army use. But the states have altered these bodies in some cases in their own shops built for the purpose, thereby converting the trucks to a number of special uses.

The majority of the trucks have been altered by substituting dump bodies and hoisting devices for the cargo and ammunition bodies with which they were equipped when received. In some cases new bodies have been built outright; in others the army bodies have been converted. Idaho, for example, has converted the steel ammunition bodies into hopper bodies by installing false bottoms sloping from front and back to a pair of drop doors, bottom dumping, which are controlled from the driver's seat. Maine has removed the cargo body from the chassis and by pivoting it near the rear and adding a hoisting device, has made the army body into a dump body. The same state and also Vermont has altered the army bodies by arranging the sides so that they can be dropped or raised, permitting the load to be dumped from the side of the truck.

Arizona sized up the trucks equipped with steel ordnance bodies and decided

that for road work they were too high and not wide enough. To make them suitable they cut the bottoms in half from front to back and then used the sides for a new bottom and the two halves of the bottom for the new sides, thus making the body about twice as wide and half as high. In addition, the trucks have been equipped with hand hoist and offset bars on the rear end in order to pull blades and drags.

### ELECTRIC LINES BUY BUSES

Rockford, Ill., Nov. 25—Earl Bengston, local dealer for White trucks, has been awarded a contract for six new motor buses which will be used as "feeders" to the Rockford City Traction Co. car lines. The buses will cost \$40,000. A special chassis is required to give the desired low center of gravity. Floor level will be 27 in. above the ground. Each bus has a capacity of 25 passengers. The traction company plans establishment of several "feeder" lines and the present contract will probably be only a forerunner of others for its northern Illinois lines.

### 1000-POUND CAR

Toledo, Nov. 25—The Automotive Corp. has announced that its new small model roadster will be in production about January 1. It plans to make in its new factory here at Oakdale and Tracy streets a small car to sell for \$475. The motor will be air-cooled and four-cylinder. The car will weigh only 1000 pounds, will have 48-in. tread and 95-in. wheelbase.

The company originally was incorporated to manufacture tractors, but has temporarily left that field.

### WILLYS PLAN ADDS 400 DEALERS

Toledo, Nov. 26—Four hundred dealers have recently been added to the Willys-Overland organization under the new plan of that organization, virtually eliminating distributors.

"Our dealers," John N. Willys, president of the company, says, "have given us concrete evidence of the wisdom of our new sales distribution policy by enabling us to show what appears to be the largest sales last month of any October in our 14 years in business."

### NASH WINS COMMISSION SUIT

Baltimore, Md., Nov. 28—The Maryland Court of Appeals, in an opinion prepared by Judge Thomas, denied the claim of Frank J. Godsel, for commissions amounting to \$5,590,970, in a suit brought against the Nash Motor Car Co. The claim was based on the sale of motor trucks to the United States government during the war.

### TOWER TRUCK RECEIVER

Greenville, Mich., Nov. 26—The Grand Rapids Trust Co. has been appointed receiver for the Tower Truck Co. It is stated that the company is not insolvent but that the receivership is to protect the assets, and it is expected the company will work out of its present difficulties.

## Michigan Organizes Show Circuit Holding 12 Cities

### Uniform Attractions Under Centralized Management One of Features of New Association

DETROIT, Nov. 26—Organization of the Michigan show circuit was perfected this week at a meeting of the Michigan Automotive Trade Assn., at which dates for 12 shows in 12 cities were set. The first show will open in Pontiac on Feb. 1 and the last will close in Battle Creek on April 8. The show dates in the several cities are: Pontiac, Feb. 1 to 4; Flint, Feb. 8 to 11; Kalamazoo, Feb. 14 to 18; Grand Rapids, Feb. 20 to 25; Muskegon, Feb. 27 to March 4; Bay City, Feb. 28 to March 4; Saginaw, March 6 to 10; Port Huron, March 15 to 18; Ypsilanti, March 21 to 22; Ann Arbor, March 24 to 25; Benton Harbor, March 28 to 31; Battle Creek, April 2 to 8. Jackson has been unable to locate a show building.

The shows in the individual cities will be directed by the local association, but general supervision of the circuit is invested in the state body, with H. H. Shuart, secretary, as the active agent. The plan of using the same decorations in each city and the same special exhibits and attractions has been approved, and these will be moved from city to city by motor truck.

As a special attraction, the circuit is planning to engage a number of artists for the period of the shows, who will give a musicale in each city in the show auditorium. Distributors and factories will be asked to supply the special car and chassis exhibits.

A. L. Zechendorf was elected treasurer of the state association, to succeed Clark Graves, of the Robson-Graves Co., Lansing, who is retiring from active business. To give Lansing representation in the executive committee, M. L. Garlock, president of the Lansing association, was named director-at-large of the state association.

### YELLOW CAB LOWERS PRICES

Chicago, Nov. 25—The manufacturing program of the Yellow Cab Mfg. Co. for the year 1922 will be double that for 1921. The company announces that this increased production schedule, together with the fact that its employees are in such splendid state of satisfaction and efficiency, enables the company to reduce prices on its taxicabs, effective Jan. 1, 1922. No orders are being accepted for delivery during the months of November and December. Deliveries are being made, however, on orders already on file.

Cash prices on model 0, five-passenger brougham taxicabs, effective Jan. 1, are as follows:

Cabs	Chassis
1 to 10.....\$2340	1 to 10.....\$1440
11 to 25..... 2290	11 to 25..... 1300
26 to 50..... 2240	26 to 50..... 1200
51 and up..... 2200	51 and up..... 1300

## September Consumption of Gas Off 65,000,000 Gals.

**Production Also Shows Big Decrease; Exports Likewise Are Reported on Slump**

WASHINGTON, Nov. 26—The domestic consumption of gasoline fell off by 65,000,000 gals. for September and production declined by approximately 25,000 gals. a day, as compared with August. Stocks of gasoline on hand at refineries on Sept. 30 decreased by 52,000,000 gals. Exports also fell in line and decreased by nearly 13,000,000 gals., as compared with those of the preceding month.

According to the statistics prepared by the Bureau of Mines, the production of gasoline for the first nine months of 1921 increased by 10 per cent over the production for the same period in 1920; imports of gasoline were decreased 17 per cent; exports decreased 15 per cent; shipments to the insular possessions gained 33 per cent, while domestic consumption increased 6 per cent.

The daily average production of lubricating oils for the month of September was 157,000 gals. larger than the production for the month of August. Stocks were decreased 12,300,000 gals. during the month. For the first nine months of 1921, the production of lubricating oils shows a decrease of 17 per cent; exports a loss of 35 per cent; shipments to insular possessions a decrease of one per cent, and domestic consumption a decrease of 21 per cent.

### BALTIMORE ASSOCIATION ELECTS

Baltimore, Md., Nov. 25—The Baltimore Automobile Trade Assn. held its annual election at its headquarters, re-electing A. H. Bishop, general manager of the Auto Car Sales & Service Co., president; E. R. Myers, a former president and head of the Motor Car Co., was elected vice-president; Frank M. Olmstead, distributor for the Oldsmobile, was chosen secretary-treasurer. T. W. Wilson, Jr., of the Wilson-Nash Co.; Arthur Stanley Zell, president of the Zell Motor Car Co.; E. T. Backus, president of the Backus Motor Car Co., and W. F. Kneip, president of the Baltimore Franklin Co. and a former president of the association, were named directors.

### ENCLOSED SHOW SUCCESS

Springfield, Mass., Nov. 25—Enclosed Car Week here proved a success in the increase of sales and the extension of the roll of prospects for winter and spring. While trade has been running well in enclosed cars since Sept. 15, the placing of attractive new models on exhibition stimulated interest to a marked extent.

### TRUCKS TO FEATURE COAST SHOW

San Francisco, Nov. 25—The sixth annual Pacific Automobile Show will be held Feb. 11 to 18, inclusive, next year. The big show, which last spring attracted a larger attendance than the

Chicago Automobile Show, will be held in the Municipal Auditorium, and George Wahlgreen, who made such a success of the 1921 exhibit, is again at the helm.

Wahlgreen has discovered a motif for the show which, he believes, will attract more attention than ever to the trucks. To attract the people to the truck basement, Wahlgreen has designed an Oriental interior for the entire auditorium, beginning with a luxurious opium den, with real Chinamen and women in it, taking in the whole of the basement. To see this, the spectators will have to go to the truck exhibit.

## Program Complete for Big Ohio Automotive Trade Meet

Columbus, O., Nov. 26—The program for the annual convention of the Ohio Automotive Trade Assn., which will be held at the Elks' Home and the Memorial Hall, Columbus, Dec. 13 to 16, inclusive, is completed. Secretary E. J. Shover of the association is in charge of the program, and special efforts have been made to secure speakers of national prominence.

The headquarters for the convention will be at the Deshler Hotel, where the registration will be looked after. All dealers of automobiles or accessories, both members and non-members, will be welcome. The registration booth will be opened Monday afternoon and evening, Dec. 12, the day previous to the convention. Governor Harry L. Davis and Mayor James J. Thomas will welcome the members. Addresses will be made by the president and secretary, and the usual committees will be named. From one to five o'clock of the first day the exhibit in Memorial Hall will be inspected. A general reception is scheduled for the evening.

On Wednesday and Thursday, Dec. 14 and 15, addresses by prominent figures in the automotive world will occupy the greater part of the program. The annual banquet will be held at the Deshler Hotel, Dec. 15. The session Dec. 16 will be devoted to the reports of the committees, election of officers and unfinished business.

A local committee consisting of Frank Lawwell, Price Kinney and Charles Justus will be in charge of entertainment features. One will be a theater party at Keith's theater and another a smoker and cabaret.

### ASSOCIATIONS UNITE IN SEATTLE

Seattle, Nov. 26—Consolidation of the executive secretaryship and headquarters of the King County Automotive Trade Assn. and the Washington Automotive Trades Assn. was announced this week by trustees of the county and executive committeemen of the state organization.

William A. Simonds, secretary-manager of the King County Assn., has assumed the duties of state secretary, and consolidated offices have been established in the Motor Car Dealers' Club. James A. Snoddy, managing secretary of the state association, resigned to enter other work.

## Little Rock Rebuilt Cars, When Priced, Boost New Ones

**Dealers Successfully Quote Low Figures at Show to Discourage Trade-ins**

LITTLE ROCK, Ark., Nov. 26—The Automobile Show held by the Little Rock Automobile Dealers' Assn. in connection with the state fair proved successful in giving the dealers a line on future business in the state, and has also placed the used car prices at a level which will enable owners to know just what to expect in the way of allowances when they offer old cars for new.

The dealers, in addition to their new car display, showed more than 30 rebuilt cars of different makes and models. The rebuilt car display attracted considerable attention from visitors attending the fair from out of town, but when they were told the cars had been rebuilt and heard the prices asked for them, they invariably shied away from that section, going to the new car display with greater interest. The renewed cars were priced in accordance with the recently reduced prices of the new cars, but it appeared to make little difference to those interested.

On the other hand, the man with a car to trade in always asked from \$200 to \$500 more than the same car, rebuilt, was offered for in the show. The used car problem continues to vex dealers in this section and many plans are proposed to eliminate the trouble. Owners appear to view the matter of a trade-in as a favor to the dealer, and the point has been reached in Little Rock where practically all dealers are refusing trade-in under any plan. They propose leaving the owner to take the old car and try to sell it for what the owner thinks it is worth, the receipts to be applied on unpaid notes on the new car, but few are taking used cars in trade.

### TEXAS SALES OFF 10 PER CENT

Dallas, Tex., Nov. 25—With the exception of used cars, there appeared to be a decrease in the automobile business in Dallas and practically all Texas for the first half of November, when compared with the first half of October. In actual retail sales reported in Dallas this decrease was about 10 per cent. The wholesale trade was about on the same basis.

But for used cars there was a decided increase in business—40 per cent over the used car business of the first half of October. This probably made the number of cars actually sold at retail equal to the number sold during the first half of October.

### SERVICE PER HOUR CHARGE CUT

Tacoma, Wash., Nov. 26—A reduction in labor charges for automobile mechanics, lowering the present price of \$1.65 per hour to \$1.25, was announced recently by some of the leading repair-shops.



## IN THE RETAIL FIELD

Ballou & Wright, one of the oldest automobile equipment and accessory organizations of Portland, Ore., has opened its new home at Tenth and Flanders.

Jordan-Springfield Co. has been formed at Springfield, Mass., to handle the Jordan car, with sales and service establishment. Herbert L. Handy, Jr., is president, and A. E. Center, treasurer and manager. F. M. Wright is retail sales manager. Center retains an interest in the Dechert Walker Motor Co., and has appointed Robert Pezzine manager of that concern.

Electric Vehicle Co., Springfield, Mass., has begun the erection of a new sales and service building at a cost of \$30,000, to be ready for occupancy early in the coming year. This company will continue to handle Kauch & Lang cars and Exide batteries.

Edward T. Davis has begun the construction of a public garage, to cost \$100,000, in Springfield, Mass. It will be finished about Feb. 1.

Bellewhite Garage, Springfield, Mass., will be opened for use Dec. 1.

C. S. Frost has been appointed service manager for Orr Motor Co., Springfield, Mass.

O. K. Motors Co., Louisville, Ky., Hupmobile distributor, has secured the Studebaker franchise in this territory. This car was formerly handled by the United Motors Corp., which has acquired the agency for the Wills Sainte Claire.

Lancaster Tire & Rubber Co., of Columbus, O., has taken a five-year lease on a building in Atlanta, where a southern branch office is to be established in the near future. J. T. Buckner, of Atlanta, will manage the branch, which will serve seven of the southern states.

W. B. Leake has been named manager of the Atlanta branch of the Kokomo Tire Co., succeeding W. M. Booth, who was promoted to a higher position in the general offices of the southern division at Louisville.

J. H. Wilson, who has had charge of General Motors' European interests, with headquarters in London, has severed his connection with General Motors and has taken over as president and general manager the Maxwell-Chalmers Sales Co., Chicago.

Southern Distributing Co., Charlotte, N. C., has been chartered to conduct a general retail and wholesale automobile and motor vehicle business. Authorized capital stock is \$100,000. Incorporators are: W. L. McDonald and M. R. McPhail, of Charlotte, and W. J. Browne, of Newark, N. J.

Addison Lambeth, Charlotte, N. C., has bought the entire stock of the automobile concern of Caldwell, Tredenick & Lambeth and is now in sole control of the business. The company sells Dodge cars. T. T. Caldwell and T. S. Tredenick, the retiring members of the firm, have made no announcement of their plans.

Moore & Stewart, Gastonia, N. C., is the name of a new firm for handling automobile, truck and tractor supplies. The firm is composed of W. P. Moore and S. M. Stewart, both formerly connected with the Gastonia Buick Co.

Rankin-Sizemore Tire & Supply Co., High Point, N. C., has been closed through a petition in bankruptcy filed in Federal court in Greensboro. Liabilities are estimated at between \$5,000 and \$6,000, with assets of about \$2,000.

Patrick, S. C.—Fire here destroyed the garage of J. C. Ingram.

A. P. Mull, Greensboro, N. C., trading as the Mull Motor Co., will answer a petition in Federal court here asking that the motor company be adjudged bankrupt. The defendant is ordered by the court to appear Nov. 28 and show cause why he should not be adjudged bankrupt.

Packard distributors in retail field from 17 cities of the south gathered at Asheville, N. C., last week for a conference. Several executive officers of the Packard Motor Co. of Detroit met with the distributors.

R. M. Robertson has been appointed wholesale sales manager for the Larson-Oldsmobile Co., Philadelphia.

Jack Hensell has been appointed manager of retail sales for the S. R. Blocksom Motor Co., Philadelphia, which merchandises Stutz cars.

Larson-Oldsmobile Co., Philadelphia, is planning to develop and intensify sales in the Philadelphia territory in a special campaign.

Joseph M. Schaab, Rock Island, Ill., has opened his new garage and salesroom.

L. W. Roskamp, Quincy, Ill., Oldsmobile agent, has taken lease on the service station lately occupied by the Chevrolet Motor Co. and will establish a salesroom and garage. The Chevrolet firm is abandoning its salesroom here and will be represented by a local agent.

Haggerty & Fleer, Kelly-Springfield agent in Quincy, Ill., has leased large new quarters and will establish a modern tire shop.

Henry H. Hall, New Britain, Conn., proprietor of the Arch Street Garage, has filed a petition in bankruptcy. His assets are given as about \$14,000 and his liabilities are listed at about \$18,000.

Thomas Brooks, Inc., has been appointed Elgin distributor in Detroit and four adjacent counties.

F. J. Jackson has been appointed manager of the Barley Motor Car Co.'s factory branch at San Francisco. George Clark, former manager, has been made sales manager of all territory west of Denver.

W. A. Henderson, manager of the Dort Auto Body Works, Kalamazoo, since its purchase from the Lull Buggy Co., has resigned.

Sealand Motor Co. has been made Templar distributor for Cleveland and northeastern Ohio.

Ethell Battery Co. has been organized at Bloomington, Ill., and will distribute the Adco battery in the state of Illinois. Mark Ethell and F. H. Ives compose the new concern. For the past ten years the latter has been in business in St. Louis, while Ethell for several years has been distributing the Chalmers and Maxwell cars at Bloomington.

H. B. Pinkerton, Peoria, Ill., has disposed of his garage and good will to Bruce Rutherford, for many years Overland distributor at Peoria. The latter has taken charge of the plant and will continue the distribution of the Dodge cars. Pinkerton is now president of the Illinois Automotive Trade Assn.

T. J. Kelly, Peoria, Ill., for many years distributor of the Studebaker car in that city, has retired and the business has been taken over by the Illinois Valley Motor Co.

Johnson-Moody Co. is erecting a large garage and sales agency at Peoria, Ill., and it will be occupied after the first of the year by the Malham Motor Co., distributor of Franklin cars and the Triangle Motor Co.

### SWINDLER BUYING GARAGES

St. Charles, Ill., Nov. 28—Garage owners are warned to be on the lookout for a swindler who pretends to be in quest of a good, paying business and who has a habit of tendering worthless checks in payment. Such an individual obtained \$100 from a St. Charles, Ill., proprietor. Giving the name of W. A. Graham and claiming to hail from South Bend, Ind., he decided to buy the plant and offered to pay \$500 to bind the bargain. He immediately remarked that he would make the check \$600 and asked for and received \$100 in cash. He has not been heard from since and the check was found to be in the "no funds" class. The same man purchased the garage of Max Opperman of Batavia, Ill.

### NEW FALCON SIX AND FOUR

Newark, O., Nov. 29—The Halladay Motors Corp. is bringing out two new models, one the Falcon Six and the other the Falcon Light Four. The prices are as follows:

	Six	Light Four
Roadster .....	\$1595	\$1295
Touring .....	1595	1295
Sedan .....	2395	2085
Coupe .....	2295	1990
Cabriolet .....	1795	1495

The body fittings are brought up to date with the adoption of cylindrical headlamps. The four-cylinder model can be fitted with a heavy duty engine with 3¼ in. bore instead of 3½ in. bore at an additional cost of \$200.

## Service to Others Jordan's Principle to Honest Success

### Manufacturer Says Saturation Point Does Not Exist and That Dodge Brothers' Advertising Is Best

FORT WAYNE, Ind., Nov. 25—Edward Jordan, president of the Jordan Motor Car Co. of Cleveland, was the guest of the Quest Club of this city recently. In his talk, Jordan declared that business, to succeed, must be founded on absolute truth and must be developed by hard work and service to other people.

"The saturation point in selling automobiles will be reached," Jordan said, "when everybody has a car who can possibly afford one and when no car ever wears out. Just as long as there is one woman who is tired of washing dishes and who sees her neighbor going out for a ride, there is still one potential prospect left for a motor car.

"I think present farm prices are the greatest obstacle to purchasing power. As long as the farmer is getting only 25 cents a bushel for corn and he raises 3200 bushels on 80 acres, he cannot be expected to develop startling purchasing power when his annual income on the 80 acres amounts to only \$800."

Asked as to what automobile advertising he considered the best at the present time, he said: "I think the Dodge Brothers advertising is the best because they are calling the attention of the public to the fact that the list price of the motor car today is not the important factor because every time the list price is cut the valuation of every owner's car is thereby reduced, and the vital thing is to find what your motor car will bring on the used market one year from now."

### SEEKS STEWART CONTROL

New York, Nov. 25—Mrs. Robert B. Honeyman, Jr., daughter of the late John K. Stewart, founder of the Stewart Mfg. Co. and the Stewart-Warner Speedometer Corp. of Chicago, has asked surrogate court to remove her uncle, Leander H. LaChance of Chicago as administrator of her father's estate. She alleges that her uncle and Martin Taylor, a New York attorney, have mismanaged the estate to their own advantage and that her uncle has caused himself to be elected president of the two companies founded by her father. Her allegations are flatly denied by LaChance.

### CAROLINA'S SHOW IN DOUBT

Charlotte, N. C., Nov. 25—The Charlotte Automotive Trades Assn. is as yet undecided about putting on the automobile show of the Carolinas next February. A very successful show was staged last February from the standpoint of excellence and beauty, but it was very expensive, and the automobile men feel that as a business booster it was hardly worth the price.

## BUSINESS NOTES

Winther Motors, Inc., recent consolidation of the Winther Motor Truck Co., Marwin Truck Corp. and Kenosha Wheel & Axle Co., all of Kenosha, Wis., has taken steps to provide more adequate facilities to accommodate development of all departments, including passenger and commercial cars, axles and wheels. There is now nearing completion a one-story factory addition, 62 by 386 ft., and it is said that further extensions are planned immediately after Jan. 1.

Davis & Thompson Co., Milwaukee, manufacturer of the Davis-Thompson continuous milling machine, is planning the erection of a new factory early in 1922.

Seymour Laboratoried Units, Inc., Milwaukee, manufacturer of automotive parts, has been placed in the hands of a receiver on application of the Matthew Addy Co., of Cleveland, O.

Milwaukee Tool & Forge Co., Milwaukee, has increased its capital stock from \$25,000 to \$50,000 and the number of directors from five to seven.

Milwaukee Shock Absorber Co. has been incorporated at Milwaukee with a capital stock of \$15,000 to manufacture and deal in automotive accessories and equipment.

Wolverine Top Co., Milwaukee, has been incorporated with \$25,000 capital to build, deal in, install and attach winter tops for passenger cars, truck cabs, etc. The incorporators are P. C. Kolinski, G. F. Lappley and John F. Bluemm, 444 Broadway, Milwaukee.

Ole Evinrude, of Milwaukee, inventor of the detachable rowboat engine, who some time ago reestablished himself in the business of manufacturing these motors, has completed the organization of his new corporation, which will be known as the Elto Outboard Motor Co. The capital stock is \$100,000.

Schpatz Mfg. Co., of Grafton, Wis., has capitalized at \$25,000 for the purpose of engaging in the manufacture and sale of automotive equipment, farm operating equipment parts, etc.

Huron Truck Co., Bad Axe, Mich., has been merged with the Ruggles Motor Truck Co., Saginaw.

Marvel Battery Co., of Chaska, Minn., has moved to the St. Paul Midway. The business is about \$500,000 annually. Larger business is the reason for the change. The company will produce from 200 to 500 batteries a day, ranging in price from \$30 to \$50.

Stutz Motor Car Co., of Indianapolis, has released its entire production of enclosed bodies to the Lang Body Co. of this city, and the work will extend over a period of some months.

Ernest J. Spitzer of Derby has been appointed temporary receiver of the Rubber Products Corp., New Haven, Conn., upon application of the Ousatonic Water Power Co., by Judge Keeler of Supreme court. His bond has been fixed at \$10,000. The receiver has been directed to continue the business for one month.

Durant Motor Co. of Michigan has applied to the Michigan Securities Commission for approval of its \$5,000,000 capital stock. Of the total capitalization it is reported that W. C. Durant held \$1,300,000 and the other directors \$1,000 each. The assets of the company are listed at \$1,499,258.

Colonial Motors, Ltd., has been incorporated at Windsor, Ontario, with a capital of \$1,000,000 for the manufacture of a specialized unit car to be known as the Canadian, which will sell in the medium price field.

Hendee Manufacturing Co., Springfield, Mass., continues to increase production and is now operating with a force of more than 1,000. Hendee production program calls for 20,000 machines this season.

Columbus, Dublin & Plain City Motor Bus Co., O., has been chartered with a capital of \$35,000 to operate a motor bus line between Columbus and Plain City. Incorporators are A. Bonthius, Mark Churches, F. Westinghouse, Fred Susi and Felix Susi.

### WANTS FEDERAL AIRCRAFT AID

Chicago, Nov. 28—Glenn L. Martin, president of the aircraft company of Cleveland bearing his name, in an address before the Chicago Rotary Club recently said that some kind of government aid to aviation was in order at this time.

"We need airplane signals or light-houses every 15 miles to guide night flyers," Martin said. "Within 15 years airplanes will be going between all our large cities at a speed in excess of 100 m.p.h., with a death rate no higher than that of the railroads at the present time.

"The motor truck uses between four and six gallons of fuel an hour and travels about 15 miles carrying a load equal to half of its own weight empty. This is about 50 per cent efficient. Airplanes are now 40 per cent efficient, measured by the same standard, using as much as 20 gallons of fuel an hour, with an average speed of 100 m.p.h. Soon it will take only seven hours to fly from Chicago to New York."

A. R. Schroeder, aviation engineer for the underwriters' laborators, condemned the newspapers for printing accounts of accidents in the air without giving fair space to the real achievements of birdmen.

### COURTESY CARS AID SERVICE

Dallas, Tex., Nov. 25—The Perry Motor Co., Dodge dealer of Dallas, has introduced a novel feature into its service department in a "courtesy car," which takes care of business men while their cars are in the service station.

The Perry Motor Co. sends the business man on to work at his downtown

place in the "courtesy car" when he drives his own car in for repairs during the day. By that method the owner is not deprived of the use of the automobile.

The service department reports improved business since the plan was introduced. The company says it will put on additional cars as the occasions demand.

### FIRST DURANT IN LONG TRIP

New York, Nov. 26—W. R. Willett, president and general manager of the Durant Motor Car Co. of Indiana, started from this city for Muncie Nov. 16 in the first Durant six to be turned out and tested at the Long Island City plant of the Durant Motor Car Co. of New York.

Experimental work on the Durant six, which will be scarcely recognizable as the former Sheridan of the General Motors line, has been practically completed, and production will begin in the near future at Muncie.

Deliveries of the Durant four to purchasers have been begun from the Long Island City plant.

### WANT CHANGE IN THEFT LAW

Columbus, O., Nov. 26—Steps are being taken by officials of Franklin County, as well as the Ohio Automobile Assn. to make necessary changes to the Atwood anti-theft law in Ohio, which will still further, it is hoped, reduce the thefts of cars. It is suggested that the bills of sale should contain the names of the seller and buyer, as well as the make of cars and the engine numbers. At present they contain only the name of the buyer. This plan would make the seller file affidavits of ownership.

## Rigid Operation Economies Key to Business Normalcy

### National Bank of Commerce Sums Up Situation in Few Striking Words

NEW YORK, Nov. 26—Business is better and sentiment throughout the country reflects courage, according to the review of business conditions for November issued by the National Bank of Commerce, one of the largest in New York. In discussing the business and credit situation, the bank says:

"Such progress as has been made by the business community toward normal conditions results from a realization that artificial levels of activity will not again be reached in any period near enough to affect the problems of today, and from a determination to practice economies of operation more rigid than heretofore thought possible. The need of personal effort and economy is also being increasingly recognized in giving a day's work for a day's pay and in care as to personal expenditure. Business men and executives now recognize that henceforth they must give the most thorough personal attention and application to their enterprises.

"Some part of the recent gain in business is unquestionably a result of seasonal demand. Permanent improvement depends to a large extent on foreign buying power, and even more on the adjustment of conditions under which the farmer operates. The last three years have clearly shown that the European situation can be stabilized only by the political and economic efforts of the countries concerned. Domestic conditions can be bettered by steady determination on the part of corporations and individuals to secure greater efficiency and to practice greater economy."

### HIGHWAY POLICE BUSY

Seattle, Nov. 25—Washington's newly organized state highway patrol made 909 arrests for violation of motor vehicles laws during September and October, the first two months of its existence. This fact was made public in the report of Commandant Louis M. Lang, issued today. Arrests were made along the 8,672 miles of highway patrolled, and fines totaled \$3,469.

Field men of the patrol are conducting a vigorous search for overloaded trucks, so far most violations being for exceeding the license, rather than the road capacity.

### HORSE THIEF CATCHERS QUIT

No one will steal a horse today, according to a dispatch from the New York Sun. The Horse Thief Detecting Society of Mamakating, Wallkill and Crawford, N. Y., has been abandoned. The 21 members of the society will split \$1,400 in the treasury, which has remained unexpended, because there are no horse thieves left to catch.



## CONCERNING MEN YOU KNOW

Robert W. Vallinette, well known in the automotive trade for many years as head of the shipping department of the Fisk Rubber Co. at Chicopee Falls, died at a Springfield, Mass., hospital several days ago, following a year of failing health.

Herbert Jung has been elected secretary of the Sheboygan (Wis.) Automotive Dealers' Association, to fill the vacancy caused by the resignation of John DeMasters, who has retired.

J. E. Buckley, for five years manager of the used car department of the Osmond Motor Co., Milwaukee, distributor of the Paige and Winton, has resigned to become associated with the Wisconsin Motor Car Co., Milwaukee, Jordan dealer, in the same capacity.

O. E. Hunt has been appointed chief engineer of the Chevrolet Motor Co. He will have general supervision of engineering in all Chevrolet plants. Hunt formerly was connected with Packard and Hares Motors.

Arthur G. Hertzler, who has been sales manager of the Bearings Company of America, of Lancaster, Pa., and connected with that firm in various capacities over a period of 18 years, will leave Lancaster for his new home in Salt Lake City, Utah.

R. S. Hollingsworth, of the McClaren Rubber Co., of Charlotte, N. C., has arrived home from California, having driven 16,000 miles through 21 states.

B. H. Anibal has been named chief engineer for the Peerless Motor Car Co., Cleveland. For years Anibal has been with the General Motors Corp.

John N. Willys and Walter Chrysler were honor guests at a dinner at the Toledo Club given by local business men.

## Court Vacates Injunction In Parenti vs. Adria Suit

Batavia, N. Y., Nov. 25—Justice Harry L. Taylor of the New York State Supreme Court has handed down a decision vacating an injunction obtained by the Parenti Motors Corp. against the Adria Motor Car Corp., restraining the defendant from making automobiles which, it was alleged, imitated the Parenti car. The court holds that the merits of the case can soon be determined in a trial on its merits, "a method of quieting controversy far more satisfactorily than that furnished by an order based on affidavits and pleadings."

"It is conceded upon the argument, for example," said the court, "that the defendants are not offending in respect to the steering gear. In fact, it is somewhat difficult to determine from the affidavits and an examination of the drawings just what features of the Parenti car are really novel, have been or are being copied or imitated by the defendants; nor is the mind of the court led at all satisfactorily to the conclusion that the defendants have been or are offending in any of the material respects claimed."

The Adria corporation asserts that two models, a five-passenger touring car and five-passenger sedan selling at \$1395 and \$1995, respectively, are being produced. The car will be marketed in Ohio by the Ohio Adria Motor Car Co., which is headed by A. W. Green, president of the Supreme Motors Corp.

## DESCENDING PRICE PROBLEMS

Milwaukee, Wis., Nov. 25—"Our merchandisers, and more especially the retailers, have during the past 25 years of ascending prices unlearned how to sell

on a descending price market," was the statement made by Charles Henry McIntosh, president of the Associated Advertising Clubs of the World, at a dinner of 600 advertising men and heads of civic and other associations here.

McIntosh, who is here to open the campaign for the 1922 convention of the A. A. C. of W., which will be held here in June, said that the convention will consider this as its chief problem.

## Bumper Crop Dollars to Buy 7206 Cars

SEATTLE, Nov. 26—Farmers of Washington, Oregon and Idaho are going to spend the proceeds of bumper crops in large part for automobiles and automobile supplies. This is evidenced by a survey made by representative farm journals of the three states—the Washington Farmers, Idaho Farmer and Oregon Farmer. Each of their 6000 subscribers received a questionnaire covering his prospective purchases of all kinds. On the basis of returns, an average was computed and applied to the total of 158,600, which is the estimated number of farmers in the three states.

In this way it is figured 7206 farmers will buy automobiles in the near future. No less than 38,249 will buy tires soon. Purchasers of dry batteries number 19,130, while 3085 need storage batteries. Accessory shops in the three states may expect to sell 5727 carbureters before many weeks are past. There will be 2352 trucks disposed of, also 828 tractors and 746 tractor plows.

Other accessories and gas engine equipment which will be sold, according to the survey, include 2542 magnetos, 15,050 piston rings, 4771 roller bearings, 5564 shock absorbers, 2688 gas engines, 3344 spray pumps, 1087 ensilage cutters, 2788 feed grinders and 10,135 feet of belting.

## COLE BRAKE TESTS

Indianapolis, Nov. 25—A brake test was recently held on the Indianapolis Speedway on one of the new model Cole 7-passenger touring cars. These tests were observed by Chester S. Ricker and J. Edward Schipper, of the Class Journal Co., who were in the car with the driver. In these tests the car was run at various speeds, and measurements were taken by holding a string above a marked line on the course, and simultaneously with the contact of the radiator and the string the brakes were applied. Measurements were then taken from the mark on the course to the frontal face of the radiator where the car had come to a standstill. The following tabulation gives the result of the test:

Miles Per Hour	Distance Required for Stop	Thermoid Standard
10	9 ft. 0 in.	9 ft. 2.4 in.
20	34 ft. 11 in.	37 ft. 0 in.
25	53 ft. 7 in.	58 ft. 0 in.
30	74 ft. 5 in.	83 ft. 3.6 in.
40	135 ft. 5 in.	148 ft. 0 in.
50	178 ft. 0 in.	231 ft. 0 in.

## State Universities Feature Automotive Training Courses

California Adds Tractor and Stationary Engine Service; Michigan Also Is Active

BERKELEY, Calif., Nov. 24—The University of California, now the largest in the world in point of attendance, announces the inauguration of tractor repair schools throughout the state, to be maintained in operation every day in the year except Sundays and national holidays, under direction of the College of Agriculture. The first school was opened at Modesto High School grounds, Modesto, Calif., Nov. 14. Actual repair work is done by the students, and there are no fixed hours for attendance, so as not to prevent men at work in the fields, and especially farmers owning tractors, or their sons, from attending whenever it is most convenient for them.

Tractors and stationary gas engines in need of repair will be repaired free of charge, if brought to the schools. Each school will have a competent repairman in charge, and three tractor experts from the agricultural engineering division of the University of California will spend their time from now on traveling from school to school, installing the repair plants and getting the teachers started. A \$2 enrollment fee, to cover costs, is the only charge connected with these schools, and the student may remain enrolled as long as he likes.

Detroit, Nov. 24—Students of the Michigan State Auto School have been taking advantage of the opportunity to inspect Detroit's big automobile plants in connection with their course of advanced mechanical training here. This week different contingents of the student body have visited the Cadillac plant, Studebaker plant No. 3, the Dodge and the Ford plants. These men have come to Detroit from all over the country and, in fact, from all over the world, to study automotive mechanics and the automobile business at the center of this great industry.

## HIGH PRICED CARS IN TEXAS

Dallas, Tex., Nov. 25—There was no sagging in the automobile business with the retail dealers during the first week of November. In fact, the retailers did more business during the first week of the month than they did during the closing week of October.

A feature of the retail business this week was the number of high-priced cars sold. The Packard agents reported the sale of 31 cars for the week. The average price was around \$3000. The low-priced cars were selling also, but it appeared to be the best week of the year for the higher priced cars.

As a general rule, the dealers are expecting good business all through the winter months. This will be true, they say, of trucks, automobiles, tires and accessories.

# The READERS' CLEARING HOUSE

## Questions & Answers on Dealers' Problems

### Obligated to Pay for Actual Damage Sustained

Q—About September fifth a traveling man came into our garage to have his chains put on his car. It was raining, so he left the car here in the garage and went somewhere else, staying for two hours. While it was raining, the car was left in the same place, with the brakes off; in the meantime, one of our mechanics came in with another car and bumped into the rear of his car. The car ran ahead and bumped into a truck, smashing one of its headlights and bending the fender slightly. We were going to fix it, but when he came back he seemed to be in an awful hurry and said that we could not fix the car here and that it would cost about seventy dollars to have it repaired. He had already paid for putting the chains on before he went to town. He had Corning canophore lenses on his car and he told us they cost eight dollars, while we sell them for three. He took the car and went, and a few days ago he came back with a repair bill, the work having been done at some garage for twenty-three dollars and some cents.

We wrote to the company where the car was made for the price of the headlight and they gave us a price of nine dollars, while on his bill he had this lamp listed for eleven dollars, the lens at five dollars and twenty-five cents, the same as we mentioned for two lenses, (only one was broken) and labor charges, etc., for the rest. We offered to settle with him for ten dollars but he refused, saying that he would settle this in court. We would like to know if he can collect a bill like this in Minnesota.—A Subscriber.

Your liability in the matter depends on whether you or your employe were negligent, thus causing the injury, while at the same time the complainant must not have been guilty of contributing to the injury. For illustration, the claimant might have been negligent, contributing to the injury by leaving the car where he did, or by leaving it unlocked.

Granting that you were negligent in the matter, and further that you were liable, still you cannot be made to pay for more than the actual damage sustained. If you can show that the bill is an overcharge, you should be able to have it reduced.

The amount involved is too small to litigate over; but sometimes it becomes necessary to do so to uphold a principle and to teach a lesson.

### "Unfair Competition"

Q—We have been doing business in the same place and under the same name for eight years. Recently a fellow by the name of Scott has come into this locality in a two by four room, and proceeds to mess affairs by styling himself, "Scott Garage"; he orders goods accordingly. What steps can we take to eliminate this nuisance?—Scott Garage, Christman, Ill.

A man has a right to use his own name in business, but he may not use it

### The Readers' Clearing House

**T**HIS department is conducted to assist dealers and service station executives in the solution of their problems.

In addressing this department, readers are requested to give the firm name and address. Also state whether a permanent file of *MOTOR AGE* is kept, for many times inquiries of an identical nature have been made and these are answered by reference to previous issues.

Inquiries not of general interest will be answered by personal letter only. Emergency questions will be replied to by letter or telegram.

Addresses of business firms will not be published in this department but will be supplied by letter.

Technical questions answered by B. M. Ikert and P. L. Dumas; Legal, by Wellington Gustin; Paint, by G. King Franklin; Architectural, by Tom Wilder; General Business questions by *MOTOR AGE* organization in conference.

to the extent of injuring another having prior claims. You might be able to restrain the new comer by showing to a court of equity that he was guilty of "unfair competition" in the use of the same name for his business. While he has the right to engage in the garage business, and further to use his name in that connection, still he may not use it in such a manner to injure your pre-established business.

### Investigate Patent Claims

Q—I am much interested in some of the problems you discuss in *MOTOR AGE*, and am wondering if you can help me out.

I have an article I wish to manufacture, but it has been on the market before in a slightly different form. There is no marking on it except the figure 361; otherwise it is blank. Do I have to look this up and see whether it has been patented, or does the fact that it is blank make it anyone's property?

If you can set me right on this, I will be greatly in debt to you.—R. F. Wade, Fond du Lac, Wis.

Any new invention which has been offered for sale to the public for more than two years prior to an application for patent is presumed in law to have been abandoned to the public and the inventor may not obtain a patent thereon.

Now the fact that there is no marking on the article you name is not conclusive, as the inventor has two years after its offer to the public in which to make application for patent. But even an allowance of a patent is not conclusive that the claimed inventor has a valid patent. The courts are filled with contests over the validity of patents. How-

ever, it would be best for you to look into this article and see if it is patented or if there is a valid application for patent pending, for should you proceed to equip a plant and prepare to manufacture, and then even manufacture and build up a trade or demand for the goods, you might find proceedings against you to enjoin you from the manufactured sale of the article.

Of course, it may be that the article you want to manufacture is not even patentable, and if so, you would have the right to manufacture it.

### Collecting Repair Bill

Q—Advise us as to the steps to be taken in order to collect a repair bill for a car repaired since July 15. We have talked to the owner several times but he puts off paying, telling us to keep it until he is ready for it. Having no space to keep it, advise as to what we should do? This truck belongs to a laundry company and we have dealt with one of the partners, so we should like to know whom to deal with in case it would be legal to sell. Victory Auto Repair Shop, Pittsburgh, Pa.

You have a lien on the car for your repairs, which being a common law lien, is one of possession only; that is, you may not sell the car under the lien, but you can hold it against the owner or any subsequent lienors, or purchasers.

Your remedy is to bring suit against the partnership and when you have judgment, levy on the truck or car and have the proper officer to sell the same.

Ordinarily every partner is an agent for the partnership, and it makes no difference with whom you dealt in making the repairs, though you must name all partners as defendant in suit.

### Liability for Freezing of Car in Storage

A party stored his Ford car in our garage. During one of the cold nights up here, the car froze and broke the head. Are we liable for freeze-ups?—Northern Automobile Co.

Your liability for freezing of a car would depend on two things. You may be liable as for negligence in failing to use the care of an ordinarily prudent man, under the same circumstances, to protect a car from freezing or becoming injured. That is, if by using ordinary care you could have prevented the freezing, then the law casts upon you the duty to use and exercise that care in the protection of the car from the weather. If you used that ordinary care you are not liable for the damage due to freezing of the car.

Again you may be liable, regardless of the question of negligence, if you agreed or contracted to take care of the car in such fashion that it may be implied the garage was to be kept warm or above the freezing point.



## Trend of Engine Cylinder Design Charted

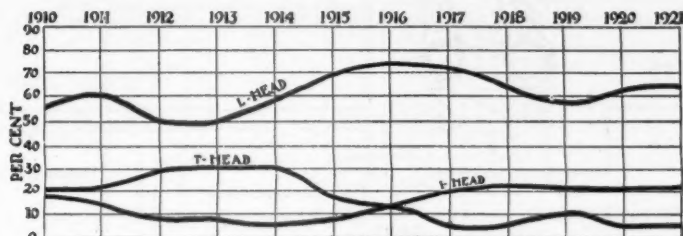


Fig. 1—Curve showing trend of engine design as regards cylinder shape and type

Q—Advise the percentages of the different types of engine now being used in automobiles, and also what this percentage was in 1913 or 1914. I am especially interested in the increase of the use of valve-in-head and sleeve valve type engine, and a comparison of them.

2—What is the relative efficiency of these two types of engines, as to power, accessibility, long life and cost of maintenance?

3—Will a valve-in-head engine develop more power than other types of equal piston displacement, and why?

4—Will a valve-in-head engine develop equal power, or less fuel consumption than other types of engine of the same piston displacement, and why?

5—Does the carbon work out between the sleeves of a sleeve valve type engine? If so, does this cause friction? How rapidly do the sleeves wear and need replacement, on a mileage basis?

6—Does carbon accumulate on the piston head in the sleeve valve engine as it does in other types?—Edmund McIntosh, Graymont, Ill.

1—The percentage of the various types of engines are shown in Fig. 1. This is not based on the quantity of engines produced but on the preponderance of each type among all makes.

2—The relative efficiency of the valve-in-head vs. the sleeve valve is a question of the individual design. The efficiency is determined by the amount of power derived from a given amount of gasoline utilized by the engine. As to accessibility, long life and cost of maintenance, the makers of both types of engines can show enviable records in this respect. Cars equipped with engines of both types are still running today that have been built as early as 1904.

3—This is also entirely a question of the individual design of the engine. The

power in an engine is not dependent alone on the location of the valves.

4—The fuel consumption also is not entirely dependent upon the type and location of the valves. The car with the highest thermal volumetric and mechanical efficiency will use the least gas. These various efficiencies are due to a multitude of causes.

5—Yes. This working out of the carbon does not cause any undue friction; it sometimes acts as a polishing agent. Sleeves in a Knight engine have been known to go as far as 70,000 miles without undue signs of wear.

6—Carbon does accumulate on the piston head in the sleeve valve engine.

### CONNECTION ON 1915 STUDEBAKER LIGHTING SWITCH

Q—Publish internal wiring diagram of the switch used on a 1915 Studebaker four. —C. T. Thomson, Dodge City, Kan.

Top view, Fig. 3, shows the inside of the switch. The bottom view shows the back side of the switch with the correct wiring connections. This is reverse in relation to the top view. Clipping them out and pasting them back to back will give a splendid work guide.

### OAKLAND BEARING TROUBLE

Q—While an Oakland model 34-C coupe was driven at 35 m.p.h. on good roads, the connecting rods Nos. 2 and 3 began to knock. After taking down the crankcase we found the rim of the upper and lower bearing gone on both rods. There was plenty of good oil in the crankcase, as we changed the oil every 500 miles. The knock started just like a flash and it seemed to me gave way all at once. What could be the trouble?—J. W. Van Duyn, Rockford, Ill.

Some time during the history of your engine the Nos. 1 and 2 rods have been deprived of the proper lubrication. It would be well to examine the condition of the connecting rods 1 and 2 in regard to their straightness. Also clean out oil holes and crankshaft. This is a force feed hollow crankshaft oiling system and dirt or abrasives in the oil or in any part of the system mixes with the oil and will be forced into the bearings, ruining them.

### NOISY TRANSMISSION IN HARROUN CAR

Q—Advise what is wrong with a 1919 Harroun car that makes a loud grinding noise when the car is drifting with the clutch thrown out but with the gearshift lever in position. The noise is very loud when the gearshift is in low and decreases for intermediate and high gear, while when the car is moving. If the clutch is thrown out and gearshift lever put into neutral, the noise stops. The clutch seems to be tight enough, as it takes hold in good shape and does not grab at all. Is this trouble in the clutch or in the transmission? What can be

done to cure it?—H. A. Batchelder, Winton, Wash., for Chiwaukee, Wash.

This trouble is in the transmission. Remove the transmission and clean the inside thoroughly; inspect and replace worn gears and bearings.

### STICKING STARTER

Q—When attempting to start an Auburn car, I find the starter throws in but will not fly back. The starter locks. I cannot move it, not even with a crank; the only way I have found to release it is to throw it in high and push the car backward 10 or 12 ft. What is the cause of sticking and what is the remedy?—H. Kammer, Cedar Rapids, Ia.

This can be due to a variety of causes, the most common of which is lack of lubrication of the worm. Dirty commutator and grounds in starter produce the same effect. We recommend that the starter be removed, cleaned, tested and inspected thoroughly.

### INSTALLING OIL PRESSURE GAGE

Q—Inform me how to install an oil pressure gage on a 1917 Buick four-cylinder, model D-35.

2—It is necessary to put the ball check valve close to the pump?—Lloyd M. Scott, Warren, Pa.

1—An oil pressure gage installed on a pump of the plunger type will give an unsteady reading, as the reciprocating action of the pump plunger will cause the pressure gage to vibrate. It is for this reason that systems equipped with this type of pump very seldom carry an oil pressure gage. If you intend to install a gage on this engine, proceed as shown in Fig. 2. You will note that the connection to oil pressure gage is made at juncture of two discharge pipes from oil pump.

2—It is advisable to place the ball check valves as close to the pump as possible.

### COMPARATIVE SIZES OF DODGE AND OTHER VALVES

Q—What other engines use valves about the width of Hudson with a stem diameter and length about the size of Dodge?—Geo. H. Ribbing, Hiteman, Ia.

Marmon 1914, 1915, 1916, models 41; Lexington 1913, 6C and 6D, 1914 4H, 1915 4K and 6M, 1916; 6-Pass. Kisselkar, 1917, 6-24; Essex 1919, Model A.

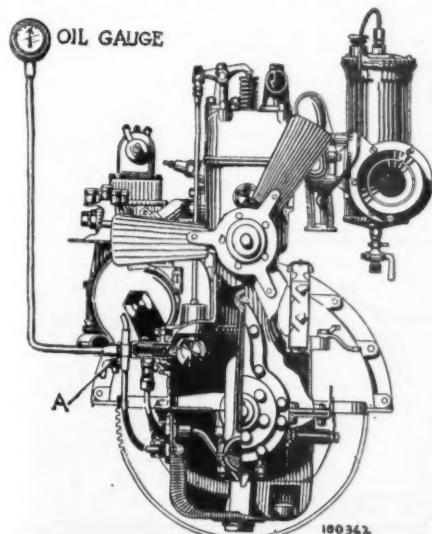


Fig. 2—Installation of oil pressure gage on Buick D35

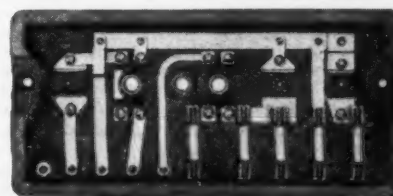
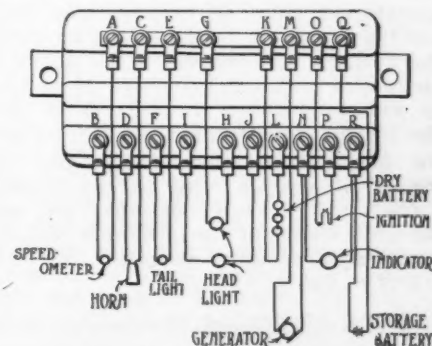


Fig. 3—Front and rear views of Studebaker 1915 four lighting switch

### GEAR RATIO FOR NATIONAL ROADSTER

Q—We have a National car, No. 5783, Series V. N. A., Motor No. 5786, stripped of all extra weight. I am using 37 by 5 tires and am going to have the wheels cut to use 33 by 5 tires. The engine is in very good shape and would do about 65 m.p.h. with the touring body on it. What gears can I use to give about 70 m.p.h.?—O. H. Brown, 1210 S. Franklin street, Muncie, Ind.

National cars of serial numbers 5501 to 7000 are known as Model MCC. A gear ratio of 2.65 to 1, which is supplied by the National factory, will produce a speed of approximately 70 m.p.h. at an engine speed of 1900 r.p.m.

### BUICK AND HAYNES WIRING DIAGRAMS

Q—Publish a wiring diagram for Buick B-6571. We think that this is a 1914 model C-25.

2—Publish a wiring diagram for Model 30 Haynes.—Keystone Steel & Wire Co., Peoria, Ill.

1—The designation B-6571 conveys no meaning to us, as it is neither a serial nor an engine number. It is probably a casting number. You are somewhat confused regarding the model of this car and, as we do not care to make an error in wiring diagrams, we would refer you to the Peoria Public Library where you will find bound copies of MOTOR AGE. The 1914 cars were designated as B-25, and the 1915 cars as C-25. The wiring diagram for the former will be found in the July 14 issue and that for the latter in the October 13 issue.

2—See Fig. 5.

### DELCO SYSTEM BURNS OUT GROUND CONNECTIONS

Q—We are having trouble with the burning out of the ground connections on the Delco generator used on the Buick model K45. We have taken the generator down and examined all the connections, fitted new brushes and regulated the charging rate to about 10 amp., when the car runs 20 m.p.h. After we run the car about three miles, the ground brush gets almost red hot.

2—Publish wiring diagram of the system.—Passantino & Dill's Garage, Thibodaux, La.

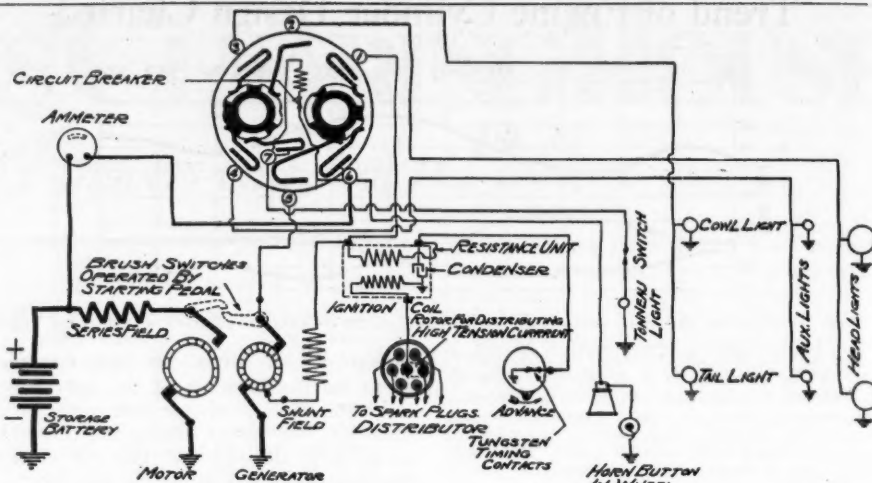
1—The trouble is that the grounding contacts of the brush holders are foul and the current is forced to pass through the spring. Remove the brush holders and polish the ground contacts thoroughly with sand paper or emery cloth. If the trouble still persists, on account of the parts being worn large, solder a pigtail of flexible wire to the brush holders and connect the other end to the iron frame of the generator under any convenient screw or nut.

2—See Fig. 4.

### LACK OF POWER IN ENGINE

Q—We are operating a Heider tractor, No. 2369, model C, with a Waukesha engine, No. 18011, which we are unable to get satisfaction from. We had the blocks broken from freezing last winter and put in new blocks, new pistons and new rings, but since have never been able to get the desired power. Would you advise reboring and new pistons to get proper compression?

2—This engine is supposed to work on gas and coal oil with the same clearance above the pistons. The strike is 6 3/4 in., the bore is 4 1/4 in., and belt speed is 800 r.p.m. Tractor speed is 1 to 4 m.p.h. We



BUICK-1919-1920 MODELS-H & K-44-45-46-47-49-50 DELCO MOTOR-GENERATOR #117 IGNITION COIL #2157 COMBINATION SWITCH #1133-1158.

Fig. 4

would like to know if there is a proper clearance for an engine of that size burning gas and, if so, what it is in cu. in.?—B. Hart, Ulysses, Kan.

1—Apparently the rings in this engine are not holding the compression. Would recommend that you carefully micrometer the cylinder bores, and if these are perfectly circular, fit new rings, which should cure the trouble. The pistons should have a clearance at the skirt of .006 in. Carefully check timing of valves by marks on flywheel.

2—The clearance volume above pistons is determined entirely by experiment of the engine manufacturer. If you retain the same dimensions as were originally in the engine, it will burn kerosene successfully. This dimension is not known in cubic inches.

### LARGE VS. SMALL VALVES

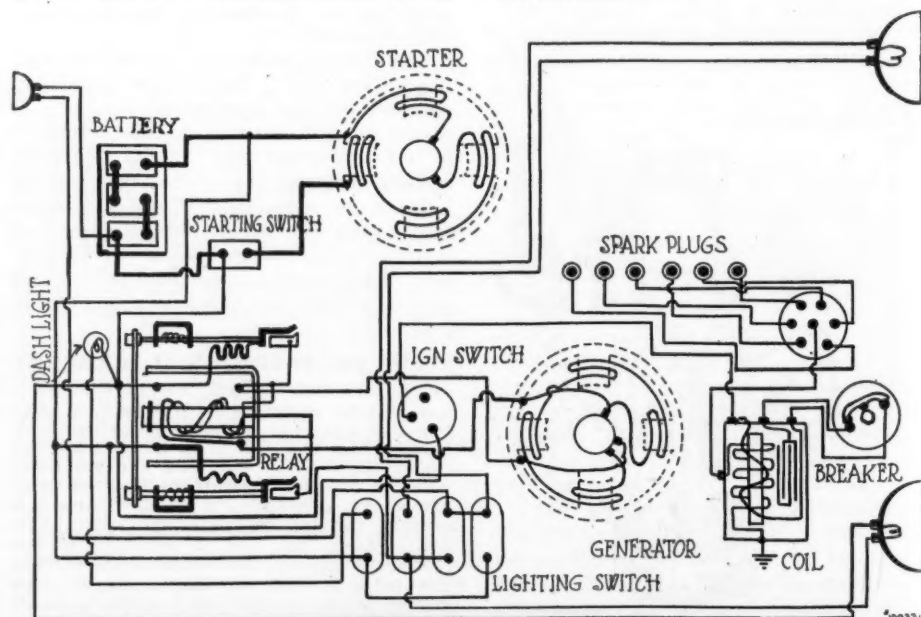
Q—We are having quite an argument as to the size of intake valves. We all know that larger valves increase engine efficiency, but is that efficiency acquired through an increased volume of gas in the cylinders or is it acquired through increased facility of action? In other words,

do small valves leave a partial vacuum after completion of the cycle? I contend that there is the same amount of intake in either condition but that larger valves simplify the action.

2—Is there any way to speed up the valve camshaft on a 1916, 22-70 Mercer to develop more power?—Darrel K. Downey, 20th Avenue Garage, Denver, Colo.

1—To get a clear idea, take an exaggerated view of the case. The ideal condition would be the ability to remove the head during the intake and exhaust strokes. As this cannot be done, a compromise must be arrived at which is to make the valves as large as possible without making them too heavy. Whoever it is that contends that there is a partial vacuum at the bottom of the section stroke is correct, and the effect of larger inlet valves is to admit more gas and thus get better volumetric efficiency.

2—It will do no good to advance the timing of the shaft. Increasing the valve lift by grinding the cams will result in higher engine speed. This is a very particular job and should be done by a concern equipped with the most accurate of equipment.



HAYNES MODEL 30-33-1915 LEECE-NEVILLE STARTER TYPE B 300 & GENERATOR TYPE B 400 REMY IGNITION

Fig. 5



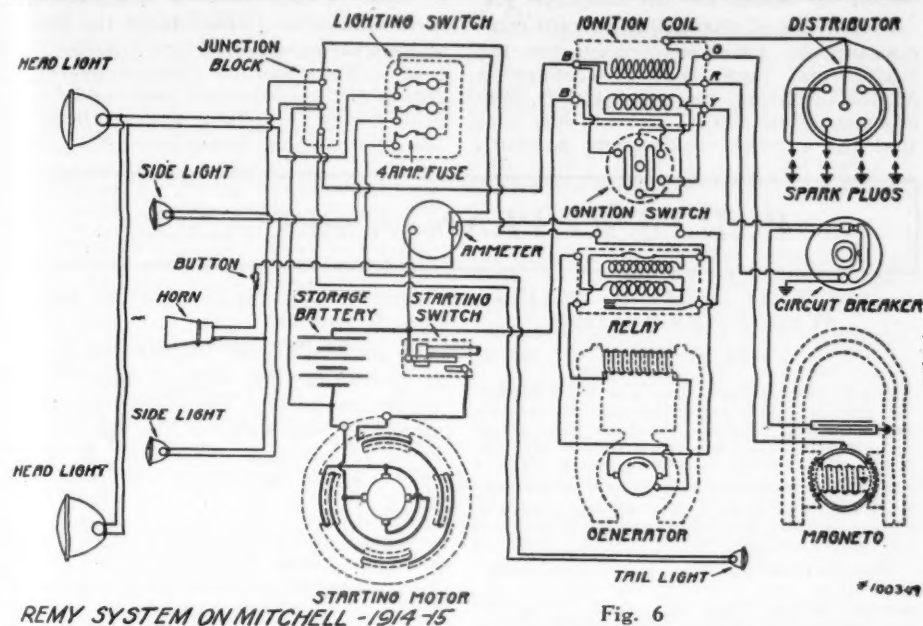


Fig. 6

## REVIVING OLD STYLE ENGINE

Q—We have a Mitchell six-cylinder roadster. The car number on the nameplate below the seat is 45238. What is the year and model?

2—The car is equipped with Bosch magneto and Zenith carburetor; compression is good on all cylinders and timing is all right, but the car does not work as it should. It is hard to pick up speed on a hard pull. After the car is rolling at about 35 m.p.h., it takes the hills with ease, but seems to hit louder on the two center cylinders. Do you think that the two center cylinders get more gas than the others on account of the manifold design? We intend to make a new manifold as per the enclosed sketch. Do you think this will help the car?

3—Do you think a Rayfield or Stromberg carburetor would make it more flexible? Any other information that will make this car perform better will be greatly appreciated.

4—Publish diagram of cutout connections to battery and generator.—Chas. Dietrich, Justice Auto Repair Shop, Louisville, Neb.

1—Model "A-60"—year, 1914.

2—We would not advise the construction of a new type manifold. The Mitchell service station advises that this car will perform satisfactorily with the original manifold. It is possible that the two center cylinders will get more gas than the others; this can be determined by removing exhaust manifold and noting color of flame through exhaust valve ports. If you intend to secure the maximum efficiency from the carburetor you now have, you must communicate with a Zenith service station.

The proper settings for the "A-60" Mitchell are as follows: choke No. 25, main jet-123, compensator, 135. Your sketch shows careful thought, but only expensive research and experiment will develop a superior manifold.

3—It is contrary to our policy to recommend articles or particular equipment through these columns.

4—See Fig. 6.

## INSTALLING AMMETER ON KING CAR

Q—Oblige us with instructions for the installation of an ammeter on a 1914 King car. This machine is equipped with a Ward-Leonard system throughout. It is a model B. We cannot find the serial number, but hope the foregoing identification will be sufficient. The car has an automatic cutout and controller on the engine-side of the dash, but no ammeter. —Ivor M. Most, Cedar Lake Garage, 2112 Beard Ave., So. Minneapolis, Minn.

See Fig. 7. The cutout and regulator is the Ward-Leonard type CD controller. The terminals are lettered, capital A, C, D, B, reading from left to right. The ammeter can be inserted in the circuits from A to the positive side of the battery.

## ENGINE OVER-OILED

Q—We have a 1920 model six-cylinder Oldsmobile. We have been having a lot of trouble with it. It eats up considerable oil and has no power, and the plugs foul continually. The valves are in good shape, but it seems to lose its compression through the pistons. Would it be advisable to put in light cast iron pistons or would it be a success to change from aluminum to iron pistons?—Salisbury Bros. & Moat, The City Garage, Gaza, Ia.

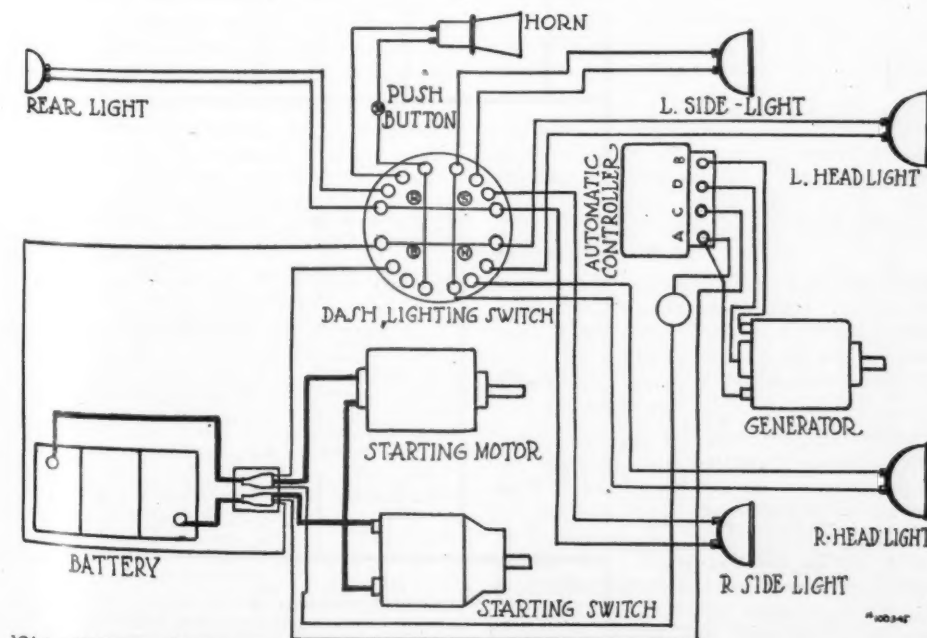
You are apparently troubled with loose fitting pistons. The following is the practice followed by the local Oldsmobile service station. Carefully micrometer the cylinder bores. To do this, you will need to make careful measurements on the engine. Just use an inside micrometer to measure the bore of the cylinders. This should be done in one position only. Do not be satisfied until you have taken a great many measurements on the cylinder bore. Start at the top; take, say, four readings at this position. Measure the diameter from sidewise direction and in fore and aft position. Also take readings from points equal distance between these points. This is the only way to make absolutely sure that the cylinder is round. This operation should be repeated at the lower position in the cylinders and also at points between these extremes.

If the cylinder is round at these various positions and the measurements do not vary more than .004 in., we would recommend that cylinders be reground. It is not necessary that this car be fitted with cast iron pistons. If new aluminum pistons are secured from the factory, they should be fitted with .003½ in. clearance at the skirt. If the cylinders are out of round to the extent of .003½ in., a leak-proof ring known as the Wel-Ever ring, should be installed in the bottom piston ring grooves. The ultimate success of this operation depends on securing exactly .003½ in. clearance of the pistons measured at the skirt. The oil pressure should not exceed 12 lbs.

## OVERHEAD VALVES ON FORD

Q—Publish diagram showing cross-sectional view of some of the newly constructed overhead valve cylinder head equipment for Ford engines. In case this sort of equipment is installed on a Ford block, what is done with the old valve ports of the block.—Iredell H. Wright, Elwood, Ind.

We have not in our files any cross sectional views of the equipment referred to. The original valve ports are closed either by gasket or plug.



1914 KING MODEL-B

Fig. 7—Wiring diagram, King Model B

### FORDSON VALVES STRIKE FORD CYLINDER HEAD

Q—Regarding the article in Nov. 3 issue stating that you can use Fordson valves in a Ford block, we advise that we reamed out the intake and exhaust and find that the valve strikes the cylinder head when opening. Also, the gaskets will have to be cut so narrow between the valves that there will be danger of blowing through. Will you advise me how to overcome this? —Ed. Johnson, Duluth, Minn.

To follow this construction requires a special cylinder head gasket which can be had made by any of the leading gasket companies. An attempt to alter the gasket by hand will usually end up in a poor job and it is not advised. The quickest and best method is to have a gasket made by a gasket manufacturer. A template of the design should be furnished the gasket manufacturer.

### GRABBING CLUTCHES AND A FORD MAGNETIZER

Q—Referring to the question by the Drury Garage of East St. Louis, Ill., in the Oct. 13 issue of Motor Age; perhaps the clutch leather was not soaked long enough before it was placed on the clutch. If this is a C 36-37 or a C 54-55, which has a housing over the clutch, plug the drain hole at the bottom with a cork, and, removing the cover plate at the top of the bell housing, pour a pint of neatsfoot oil into the housing and leave it there. The flywheel will splash it around. Do this whenever the clutch begins grabbing. If signs of slipping appear, remove the cork and drain the oil. We have tried this on model C Buicks with very good success.

2—Oblige us with a description of an inexpensive way of reducing a 110-volt direct current to 32-volt for charging Ford magnetos.

3—Also give us directions for using alternating current.—George A. Swanson, Craig, Neb.

1—We thank Mr. Swanson for his explanation of his way of overcoming the grabbing of Buick clutches. It is a harmless method to try and we believe it should give good results.

2—Lamp bank resistances have been illustrated many times in the past. The latest illustration will be found on page 35 of the June 30 issue. Another, for the charging of batteries, is shortly to appear. Regardless of the purpose for which the lamp bank resistance is to be used, the construction is the same. The theory underlying the apparatus is that each lamp will pass a certain amount of current and that, therefore, the more lamps, the more current available. As a minimum of 30 amp. is needed for Ford magnet charging, a bank of 30-100 watt or 60-55 watt lamps will be needed. As the current required is quite heavy, the apparatus must be connected to the service on the line side and not the house side of the fuses.

By far the better way is to use a storage battery for the charging job and charge them up overnight through a lamp bank, resistance made up of only 5-100 watts or 10-55 watt lamps. Two-six-volt batteries, such as are used in the Dodge or Maxwell cars, or four six-volt batteries, such as are used in Ford, Chevrolet or Overland, will give excellent results.

One thorough battery charge will be sufficient to charge at least 10 Ford magnetos. The batteries must be con-

nected in series for the magneto job.

3—The use of alternating current complicates the job considerably, for the reason that some sort of rectifier is needed to change the current over from alternating to direct. Due to the fact that the current requirement is heavy,

at least 30 amp. D.C., a large rectifier is recommended. Here again the use of storage batteries is, without question, the best. They can be charged overnight through the medium of any one of several makes of inexpensive rectifiers of the vibrating or Aigon filled bulb type.

## BUILDING PLAN ASSISTANCE

### A BATTERY SERVICE, FILLING STATION COMBINATION

#### PLAN 362

Q—At the present time we contemplate the erection of a building for our battery and electrical service. Across the corner it is desired that we have an oil station, and two small stores to rent at the other side of the building. We would appreciate it if you would give us some information or plans that would assist us in designing this building.

You perhaps will want the following information: two departments will be operated, battery and electrical repair departments. We will want room for five or six cars. Five men will be employed in the repairshop; no accessory department other than the electrical supplies.—Wynes Exide Battery Co., Moline, Ill.

Rather than separate the garage and electric and battery shop, we think it more advisable to keep them together, leaving the filling station as the sole representative on the corner.

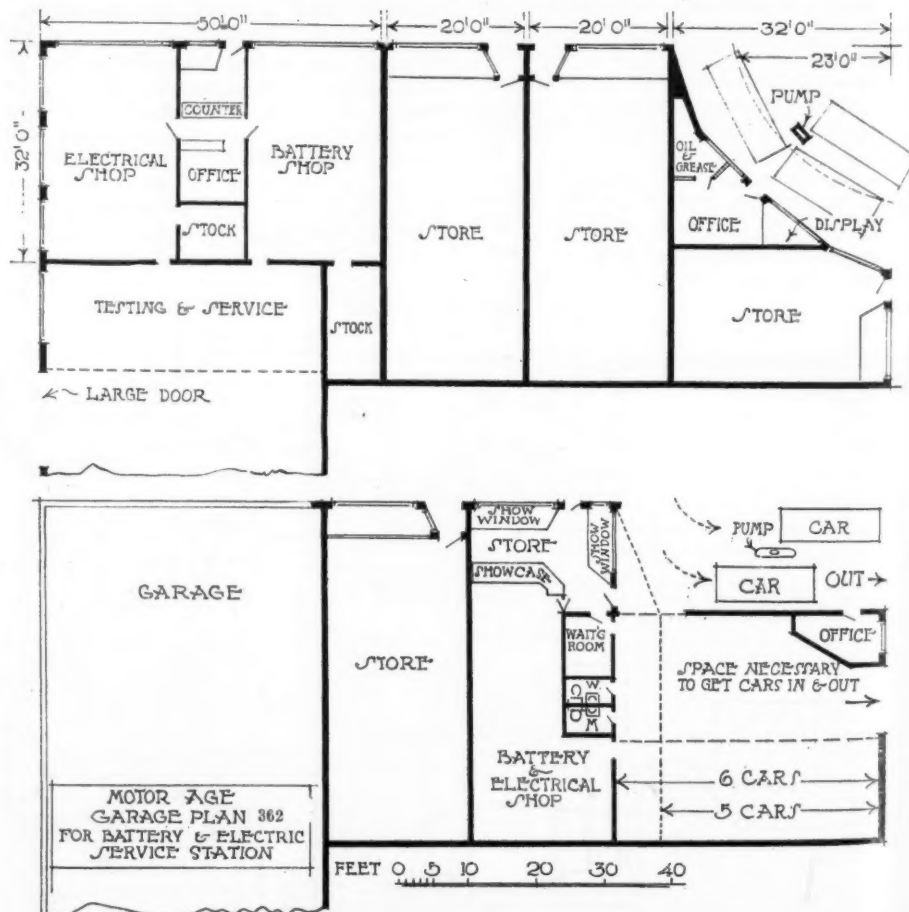
You will need some of the garage space for testing electrical equipment and making battery changes and for general service work, and consequently this

should be adjacent to the shops and office, if possible.

If you could make the garage part 50 ft. instead of 42 ft. wide, it would be an advantage, as cars could then be placed along the side walls of the building instead of in tiers crosswise. A 42 ft. space is too narrow for anything but Fords.

Another feature is that a 23 ft. radius for your filling station is rather small. You can see by your diagram that should a long Packard car stop for gas it would extend out on the sidewalk. We show in our plan a 32 ft. radius for the filling station which will allow two long cars in back of the pump and allow cars that fill in the section in front of it without obstructing the sidewalk.

Regarding the working plan, we can hardly offer to render this service, as it runs into money too fast, but we will make you a plan and send you blueprints. Many of our readers use these plans to build, where an experienced builder can be engaged.



Plan 362—Suitable for garage, semi-filling station and battery and electrical shop



## INSTALLING GENERATOR ON 1911 CADILLAC

Q—We have been asked to install a motor-generator on a 1911 Cadillac. We are of the opinion that this could be done by removing the magneto and mounting the motor-generator on the magneto bracket or a bracket of special design to suit the equipment. The motor-generator would then be driven through the oil pump shaft, which revolves at engine speed. Can you suggest a motor-generator that would be most suitable for this installation? This engine is equipped for battery ignition. Show a sketch of your suggestion.—H. A. Gumm, Box 695, Mar-selles, Ill.

We would suggest that you install two separate units, a generator driven from the lubricator shaft and a starting motor meshing with the flywheel. The installation, as shown in Fig. 8, should be comparatively simple and inexpensive. We recommend that you procure Auto-Lite equipment, generator model GD, and starting motor MC, such as was used on the model 83 Overland. These may be procured from the Electric Auto-Lite Co., Toledo, O., or from the dealers in used equipment whose advertisements you will find in our advertising section. Silent gears and chain of one-inch face will drive the generator nicely. The following is the current output for the generator at the various speeds:

- 5 amp.—800-1000 r.p.m.
- 10 amp.—1350-1575 r.p.m.
- 12.5 amp.—1700-2050 r.p.m.
- 15 amp.—2250-3300 r.p.m.
- 15-18 amp.—3300-3700 r.p.m.

As you will want a current of 12 to 15 amp. at a maximum engine speed of about 1000 to 1200, we recommend that you make the generator gearing two to one. That is to say, the gear on the pump shaft should be twice the size of the generator gear. The flywheel can be fitted with a ring gear and the starting motor mounted ahead of it, effecting the drive through the medium of a Bendix shaft and gear. The above outlined installation has been made on numbers of old cars and has given uniformly satisfactory results. Of course, some ingenuity will be necessary in the design of the generator and starting motor brackets. However, any skillful blacksmith should be able to make the forging.

## INCORRECT DATA ON POOR RACING CAR MATERIAL

Q—We are contemplating rebuilding a Buick chassis model 21-34 (4-cyl.) into a dirt track car and will appreciate any recommendations you are able to make. We expect to build this car to be very fast and also leave it as near a stock model as possible. We would like your advice on the following:

- 1—Will it be possible to increase the engine speed to 3300 r.p.m.?
- 2—Will the present Delco ignition prove satisfactory for high speed work or would a magneto be better?
- 3—Would you advise installing a pressure gasoline and oiling system or are the present ones capable for high speed work?

4—How much should the compression be raised?

5—What changes are necessary in the timing of both valves and in the ignition?

This car is to be equipped with special nickel steel driving gears, ratio 3 to 1, special pistons (2 ring), and wire wheels using 32 by 4 cord tires. With a 109 in. wheelbase, the weight will be approximately 1850 lbs. It is to be used for track work exclusively.—Donald F. Emerson, care of W. T. Fenton, Lincoln, Nebr.

You are evidently badly confused on the chassis model. The model 21 was built in 1911 and the engine was  $4\frac{1}{2}$  by  $4\frac{1}{2}$ . The model 34 was built in 1912 and the bore and stroke was  $3\frac{3}{4}$  by  $3\frac{3}{4}$ .

1—Possible, but the expense will be all out of proportion to the value of the car.

2—If it were one of the later Delco models, we would advise you to retain it. In view of the age, we believe that a magneto will be better.

3—The present splash lubricating sys-

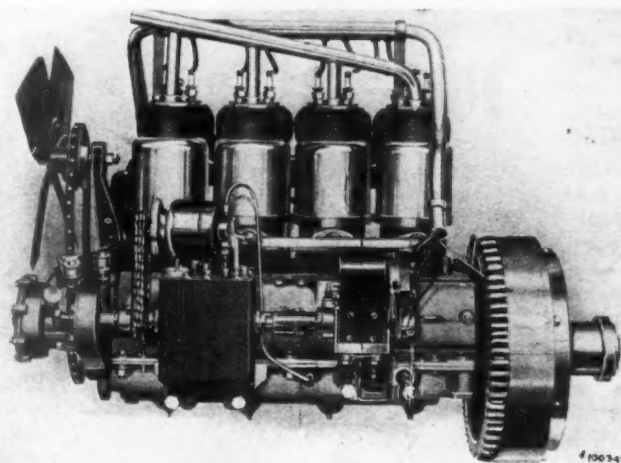


Fig. 8—Model 1911 Cadillac engine with suggestions for the installation of a generator and cranking motor

tem would be inadequate for racing. We therefore advise that both lubrication and fuel feed systems be pressure.

4—This is problematical. We should aim for 90 to 100 lbs.

5—Timing of the two models is as follows: (measurements are on flywheel.)

Model 21—Inlet opens  $3/32$  in. past upper dead center and closes  $13/32$  in. past lower dead center; exhaust opens  $15/64$  in. before lower dead center and closes  $1/16$  in. past upper dead center; the lift is  $9/32$  in.

Model 34—Inlet opens  $3/32$  in. past upper dead center and closes  $17/64$  in. past lower dead center; exhaust opens  $21/32$  in. before lower dead center and closes  $1/16$  in. past upper dead center; the lift is  $1/4$  in.

You can plainly see from the foregoing figures that without knowing exactly what the model is, we are unable to advise regarding timing. However, it would be impossible to change the timing to any worthwhile extent without installing a specially designed camshaft. As we have mentioned in the first paragraph, the cost would be out of proportion to the value of the car.

Your ideas are very good, but we would advise you to work them out on a later model chassis.

## CAUSE OF CRANKPIN WEAR

Q—We are working on a car that has been driven 10,000 miles. The oil has been changed frequently and the connecting rods have been adjusted several times. What causes the connecting rod and crankshaft bearing to wear uneven or in small ridges?

2—Could they be trued up with a crankpin tool such as shown on page 41 of the October 20 issue?

3—Would it be of any benefit to the oiling system if the vapor caused by compression leaking by the rings was drawn out by means of vacuum through the breather tube?

4—What is the proper clearance on connecting rod bearings per one inch diameter?

5—Is it a good policy to tighten up the connecting rod bearings fairly tight and then loosen them by letting the engine run slow until they are fitted?—Wm. Heiss, Ansley, Nebr.

1—The ridges are caused by cutting. At some time or other the engine has been run very low on oil and cutting has resulted.

2—By carefully following directions, we have no doubt that the tool mentioned will true the pins satisfactorily. The other method of truing is by grinding.

3—Systems of this kind have been placed on the market and we understand that they are giving fairly good results. You will realize that by creating a vacuum in the crankcase, oil leakage will be greatly lessened.

4—Theoretically, .00125. However, this is largely governed by the lubrication system used.

5—This method is satisfactory, but burning-in is much better. After the bearings are run in, it is well to examine them and again fit them by removing the thinnest shim, if it is possible to do so.

## TIMING OF 1921 STUDEBAKER ENGINE

Q—Inform us of the proper valve timing of the Studebaker "Light Six" and special Six, 1921 models.—Geo. Sproesser, Lawrence Garage, Reading, Pa.

The exact timing in degrees or inches is not available. However, we fail to understand how the timing can be missed, as the camshaft gear is marked with two zeros and the crankshaft gear with one. They are to be meshed with the one zero between the other two. Besides this, the flywheel is marked with the customary timing marks. Timing the ignition is a very simple matter. With the number one piston on the top dead center of the compression stroke and the spark control lever set to the full retard position, turn the distributor shaft in its normal direction until the breaker points have just separated. Of course, timing one cylinder times the whole engine.

# The Accessory Show Case

## New Fitments for the Car

### VACUUM GROOVE PISTON RING

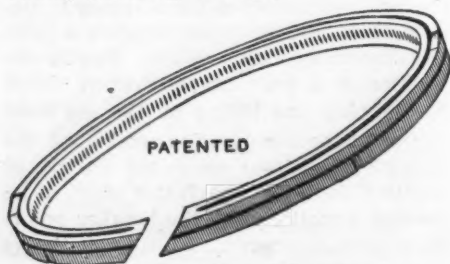
These rings operate on the principle of a vacuum groove which hermetically seals the ring to the shoulder of the piston, preventing escape of power or pumping of oil through the space back of the ring, a space hitherto neglected. Another feature of the ring is the side groove, which by taking part of the force of the power, equalizes tension on the ring and reduces friction. The rings are individually cast of close-grained gray iron, hammered to equalize radial tension, have the simple but effective 45 deg. angular split joint and are finely and accurately ground to .001 in. tolerance. They are manufactured by the Vacuum Groove Piston Ring Corp., 3107-3119 Adeline Street, Oakland, Calif.

### STURDY INSPIRATOR FOR PRIMING ENGINES

This device for priming engines is said to be automatic and fool-proof. All packing is of a nature said to be not affected by gasoline and is kept tight by the action of springs which take up any wear. Air is taken in through a hole in the stem which is covered and closed when the handle is pushed way in. Inside the barrel, the plunger and valves are so arranged that a measured amount of air and gasoline is taken in on each suction stroke and discharged into the manifold on the compression stroke. The atomizer or spray nozzles furnished are of two types, one giving a disk shape or radial jet, the other bell shaped. Their use is determined by the type of manifold. The inspirator is automatically self-closing, preventing it from taking in raw gasoline through the connections. Gray-Hoffman Co., 542 North Parkside Ave., Chicago, successors to the Gray-Heath Co.

### TURNOVA VALVE CAP

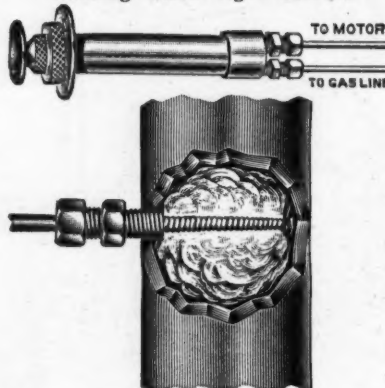
This is a quick action valve cap, designed so that it is not necessary to detach it from the valve stem to inflate the tire. A swivel arrangement permits the top of the cap to be swung down to one side. This cap is claimed to be air tight, sealing leaks in the valve itself when attached. C. A. Bindhammer, 4523 Champlain Ave., Chicago.



Vacuum groove piston ring



Steering wheel light control



Sturdy inspirator for priming engines



Air cushion accelerator



The Turnova valve cap. Above, cap swung out for inflation

### AIR CUSHION ACCELERATOR

The device consists of a large aluminum pedal, which is hinged to the floor board and provided with an air cylinder operating over a piston attached to the toe-board. The bottom of the pedal rests on the standard accelerator with which the car is equipped. When the pedal is pushed down, the air in the cylinder is forced through a valve at the top. A spring lock valve at the top of the cylinder makes it possible by a turn of the thumb and finger to restrict the orifice through which the air passes, until the exact degree of cushioning desired is obtained. Price \$9.50. Black & Decker Mfg. Co., Baltimore, Md.

### STEERING WHEEL LIGHT CONTROL

The Safety Light control comprises a set of button switches located on an extension from the steering column, so that they are accessible from outside the rim of the steering wheel on the driver's right side. The idea of putting them in such a position, in place of on the wheel, is that in the dark the steering wheel is turned and the buttons consequently are moved to a different position relative to the driver. The buttons with this device are always in the same place in relation to the driver's seat. Price, complete with the switch box, full complement of wires and the necessary flexible conduit, is \$16.50. Winchester Eng. Corp., Indianapolis.

### IMPROVED RIM BOLT

A vexing problem in steel wheel construction is solved by an invention now being applied to the Gier Tuarc steel wheel. Hitherto when rim bolts were used on this type of wheel, the bolt was virtually an integral part of the wheel. Not infrequently rim bolts are stripped by over-strong drivers in applying the wrench. This formerly meant a machine job in replacing the bolt. In the new Tuarc bolt this danger is eliminated by using a rim bolt with a hook-shaped head. This head hooks into a slot in the wheel felloe, and is drawn up tight by the application of the Tuarc clamping rings. A light metal clip, used to hold the bolt in place, is all that needs to be removed, if replacement of the bolt becomes necessary.—Motor Wheel Corp., 701 E. Saginaw St., Lansing, Mich.

### EXTENSION FOR FORD BRAKE LEVER

This device places the Ford brake lever within easy reach of the driver. It is especially convenient during winter months when the cold necessitates heavy, bulky clothing and the use of a robe, making it more convenient to operate the hand lever when reversing. Price, \$2. Ajax Auto Parts Co., Racine, Wis.



# Service Equipment

## Time Savers for the Shop

### BRIDGEPORT CYLINDER REFINISHING MACHINE

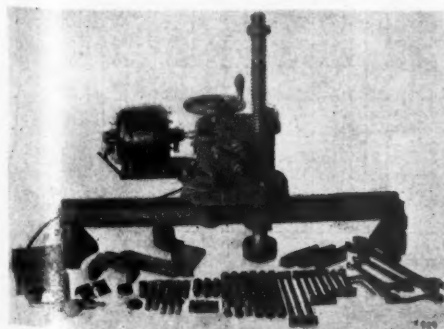
This machine comprises a substantial little slidable head, which is provided with an accurately guided, rotating cutter bar, arranged for various sizes of herringbone reamers. The bar is driven at a slow speed and feed by a small electric motor which can be driven from any lighting circuit. The head is supported and guided upon a substantial base which is fastened to the cylinder block by adjustable brackets, means being provided for quick alignment of this base with the center line of the cylinders, and further for finally centering the bar with each cylinder in turn. The cutter bar can be quickly disengaged from its driving mechanism, and raised and lowered to and from the work by a small crank handle. A complete outfit is furnished with the machine, comprising a stand, with various sizes of bolts, clamps, stops and adjustable studs to meet practically all requirements. Bridgeport Cutter Works, Inc., 50 Remer St., Bridgeport, Conn.

### SAVEALL POSITIVE SAFETY QUICK CHANGE CHUCK

This chuck has a safety device which prevents drills, taps, reamers, counterbores, etc., from breaking and burning. This safety device is nothing more or less than a soft steel pin, which drives the collet and shears off when the cutting tool is overloaded. The pin is held in place by a pointed screw which fits in a groove in the pin. When it shears off, it can be removed by loosening the screw and inserting a new pin. Certain sizes of shearing pins are applicable to drills of varying diameters; for instance, the same pin is used with 37/64 to 29/32 in. diameter drills.—The Wade-American Tool Co., 49 River st., Waltham, Mass.

### CLY-LAP COMPOUND

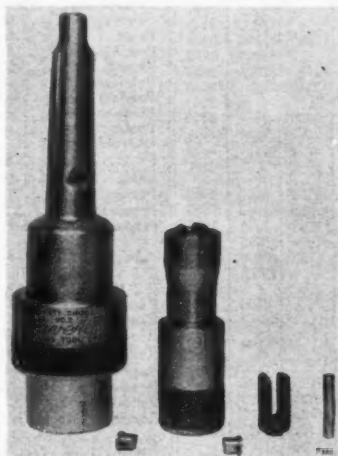
Cly-lap is a new lapping compound. It does not contain emery, ground glass or carborundum. It is claimed that the abrasive will not imbed itself in the



Bridgeport cylinder refinishing machine

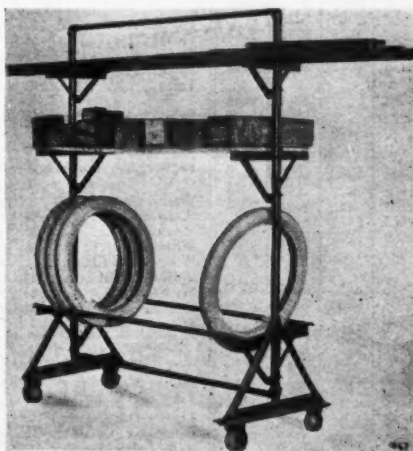


Nickel-in-the-slot air filling station



Saveall safety quick change chuck

metal. It is fast and uniform cutting and produces a high finish. It is prepared in two sizes and three grades; 4 oz. cans (trial size) fine, medium and coarse, \$1.50 list; 8 oz. cans (full size) fine, medium and coarse, \$2.50 list.—Cly-Lap Products Co., Seattle, Wash.



Stock and tire rack

### MASTER BATTERY CHARGER

The Master charger is claimed to be different in construction from others. This charger uses a hard-rubber panel switchboard reinforced, and a positive insulator. The knob switch, located in the upper left hand corner of the instrument, is the main shut-off switch and controls the incoming current. The double knife switch located in the lower righthand corner operates and controls the capacity desired or the quantity charging. The control lever, centrally located, is operated in divisions of 1/2 ampere, when knife switch is in contact. If knife switch is left open each notch in the control box advances 1/2 ampere, making it one ampere per hour. Leader Battery Equipment Co., 320 Title Guaranty Bldg., St. Louis.

### STOCK AND TIRE RACK

A rack like this can be put to a variety of uses. The illustration shows the rack serving three purposes. The top brackets are used for pipe and steel bar stock; the middle brackets are equipped with a shelf for stocking various small parts in boxes, and the bottom brackets with rails for stocking and displaying tires. Dimensions: base, 30 in.; length, 62 in.; height, 84 in. Additional brackets may be had, as ordered, also extra rails for stocking tires. Welded Products Mfg. Co., Milwaukee.

### NICKEL-IN-THE-SLOT AIR FILLING STATION

The manufacturer leases this machine to the garageman for 17 years for \$17.50. One-third of the nickles goes to the garageman and the balance to the lessee. The garageman replaces the worn out hose and air pressure; all other parts are supplied by the manufacturer, without charge. By setting the lever on the dial to the desired pressure, that pressure is supplied and then automatically cuts out.—Western Mfg. Co., Oskaloosa, Ia.



Master battery charger

## Specifications of Current Passenger Car Models

NAME AND MODEL	Engine Make	Cylinders, Bore and Stroke	WB	Tires	2-Pass.	5-Pass.	7-Pass.	Coupe	Sedan	NAME AND MODEL	Engine Make	Cylinders, Bore and Stroke	WB	Tires	2-Pass.	5-Pass.	7-Pass.	Coupe	Sedan
Ambassador.....R	Cont.	6-3 $\frac{1}{2}$ x5 $\frac{1}{2}$	136	33x5	14500	14500	14500	14500	14500	Maxwell.....25	Ow.	4-3 $\frac{1}{2}$ x4 $\frac{1}{2}$	109	31x4	\$ 885	\$ 885	\$1385	\$1485	
American.....C	H-S.	6-3 $\frac{1}{2}$ x5	127	32x4	2195	2195	2350	2195	2195	McFarlan.....1921	Ow.	6-4 $\frac{1}{2}$ x6	140	33x5	6300	6300	6300	7500	
Anderson.....Series 40	Cont.	6-3 $\frac{1}{2}$ x4 $\frac{1}{2}$	120	33x4	2195	1650	1795	2450	2550	Mercer.....Series 5	Ow.	4-3 $\frac{1}{2}$ x6 $\frac{1}{2}$	132	32x4 $\frac{1}{2}$	3950	3950	3950	5250	
Apperson.....8-21-S	Ow.	8-3 $\frac{1}{2}$ x5	130	34x4 $\frac{1}{2}$	3000	3250	4500	4500	4500	Merit.....Cont.	Cont.	6-3 $\frac{1}{2}$ x4 $\frac{1}{2}$	119	32x4	1055	1985	1985	2805	
Apperson.....Anniversary	Ow.	8-3 $\frac{1}{2}$ x5	130	34x4 $\frac{1}{2}$	3500	3750	4500	4500	4500	Meteor.....R & RR	Dues.	4-4 $\frac{1}{2}$ x6	129	32x4 $\frac{1}{2}$	5500	5500	5500	5500	
Auburn.....6-31	Cont.	6-3 $\frac{1}{2}$ x4 $\frac{1}{2}$	121	32x4	1670	1695	1760	2475	2495	Metz.....M6	Rut.	6-3 $\frac{1}{2}$ x5	120	32x4	1905	1995	2795	2805	
Beggs.....20T	Cont.	6-3 $\frac{1}{2}$ x4 $\frac{1}{2}$	120	33x4	1775	1520	2320	2420	2420	Mitchell.....F-50	Ow.	6-3 $\frac{1}{2}$ x5	120	32x4	1490	1490	1490	1490	
Bell.....4-32	H-S.	4-3 $\frac{1}{2}$ x5	114	31x4	1495	1495	1495	1495	1495	Mitchell.....F-50	Ow.	6-3 $\frac{1}{2}$ x5	127	33x4	1795	1795	1795	1795	
Bell.....6-50	H-S.	6-3 $\frac{1}{2}$ x5	124	32x4	1095	1095	1095	1095	1095	Mitchell.....F-50	Ow.	6-3 $\frac{1}{2}$ x5	120	33x4	2290	2290	2290	2290	
Biddle.....B1 & B5	Buda.	4-3 $\frac{1}{2}$ x5 $\frac{1}{2}$	121	32x4	3475	3475	4350	4350	4350	Moller.....A	Ow.	4-2 $\frac{1}{2}$ x4	100	27x3 $\frac{1}{2}$	2000	2000	2000	2000	
Birch Super-Four	H-S.	4-3 $\frac{1}{2}$ x5	117	33x4	1195	1195	1245	1795	1795	Monroe.....S-9 & 10	Ow.	4-3 $\frac{1}{2}$ x4 $\frac{1}{2}$	115	32x3 $\frac{1}{2}$	1295	1295	1295	1295	
Birch Light Six	Leit.	4-3 $\frac{1}{2}$ x4 $\frac{1}{2}$	108	30x3 $\frac{1}{2}$	995	995	995	995	995	Monroe.....S-11 & 12	Ow.	4-3 $\frac{1}{2}$ x4 $\frac{1}{2}$	115	33x4	2075	2075	2075	2075	
Birch Light Six	H-S.	4-3 $\frac{1}{2}$ x5	117	33x4	1305	1395	1445	1995	1995	Moore.....6-48	Cont.	6-3 $\frac{1}{2}$ x4 $\frac{1}{2}$	122	32x4	1785	1785	2285	2785	
Bour-Davis.....21S	Cont.	6-3 $\frac{1}{2}$ x5 $\frac{1}{2}$	126	33x4 $\frac{1}{2}$	2385	2385	2385	2385	2385	Moon.....6-68	Cont.	6-3 $\frac{1}{2}$ x5 $\frac{1}{2}$	125	32x4 $\frac{1}{2}$	2285	2285	2285	2285	
Brewster.....91	Ow.	125	32x4 $\frac{1}{2}$	17000	7000	7000	7000	7000	7000	Murray-Mac Six	Ow.	6-3 $\frac{1}{2}$ x5 $\frac{1}{2}$	128	34x4 $\frac{1}{2}$	4250	4250	4250	4250	
Buick.....1922-31-35-36-37	Ow.	4-3 $\frac{1}{2}$ x4 $\frac{1}{2}$	109	31x4	935	975	1475	1650	1650	Nash.....681-7	Ow.	6-3 $\frac{1}{2}$ x5	121	33x4	1525	1545	2395	2695	
Buick.....1922-44-5-6-7	Ow.	6-3 $\frac{1}{2}$ x4 $\frac{1}{2}$	118	33x4 $\frac{1}{2}$	1495	1525	2135	2435	2435	Nash.....682	Ow.	6-3 $\frac{1}{2}$ x5	127	34x4 $\frac{1}{2}$	1695	1695	1695	1695	
Buick.....1922-48-9-50	Ow.	6-3 $\frac{1}{2}$ x4 $\frac{1}{2}$	124	34x4 $\frac{1}{2}$	1735	2325	2635	2635	2635	Nash Four.....41-4	Ow.	4-3 $\frac{1}{2}$ x5	112	33x4	1025	1045	1645	1835	
Bush.....E.C.4	Lye.	6-3 $\frac{1}{2}$ x5	116	33x4	1195	1195	1195	1195	1195	National Sextet.....BB	Ow.	6-3 $\frac{1}{2}$ x5 $\frac{1}{2}$	130	32x4 $\frac{1}{2}$	2900	2900	2900	4240	
Bush.....E.C.6	Rut.	6-3 $\frac{1}{2}$ x5	116	33x4	1345	1345	1345	1345	1345	Noma.....1C	Cont.	6-3 $\frac{1}{2}$ x4 $\frac{1}{2}$	128	32x4 $\frac{1}{2}$	2800	2850	3200	3700	
Cadillac.....61	Ow.	8-3 $\frac{1}{2}$ x5 $\frac{1}{2}$	132	33x5	3790	3790	3940	4690	4690	Northway.....430-KS	Lye.	4-3 $\frac{1}{2}$ x5	116	32x3 $\frac{1}{2}$	1035	1035	1035	1035	
Case.....V	Cont.	6-3 $\frac{1}{2}$ x5 $\frac{1}{2}$	126	34x4 $\frac{1}{2}$	1935	1935	1935	1935	1935	Oakland.....34-D	Ow.	6-2 $\frac{1}{2}$ x4 $\frac{1}{2}$	115	32x4	1095	1145	1265	1725	
Chalmers.....6-30	Ow.	6-3 $\frac{1}{2}$ x4 $\frac{1}{2}$	117	32x4	1245	1295	1995	2295	2295	Ogden.....6-T	Cont.	6-3 $\frac{1}{2}$ x5 $\frac{1}{2}$	134	33x5	4250	4250	4375	5500	
Chalmers.....6-30	Ow.	6-3 $\frac{1}{2}$ x4 $\frac{1}{2}$	122	33x4 $\frac{1}{2}$	1395	1395	1395	1395	1395	Oldsmobile.....43-A	Ow.	4-3 $\frac{1}{2}$ x5 $\frac{1}{2}$	115	32x4	1145	1145	1645	1845	
Champion.....Tourist	Lye.	4-3 $\frac{1}{2}$ x5	113	32x3 $\frac{1}{2}$	995	995	1050	1050	1050	Oldsmobile.....37-A	Ow.	6-2 $\frac{1}{2}$ x4 $\frac{1}{2}$	112	32x4	1450	1450	2145	2145	
Champion.....Special	H-S.	4-3 $\frac{1}{2}$ x5	118	32x4	1295	1295	1295	1295	1295	Oldsmobile.....46	Ow.	8-2 $\frac{1}{2}$ x4 $\frac{1}{2}$	122	33x4 $\frac{1}{2}$	1735	1735	2635	2635	
Chandler.....Six	Ow.	6-3 $\frac{1}{2}$ x5	123	33x4	1785	1785	1785	2785	2885	Oldsmobile.....47	Ow.	8-2 $\frac{1}{2}$ x4 $\frac{1}{2}$	115	32x4	1625	1625	2185	2425	
Chevrolet.....490	Ow.	4-3 $\frac{1}{2}$ x4	102	30x3 $\frac{1}{2}$	525	525	525	875	875	Overland.....4	Ow.	4-3 $\frac{1}{2}$ x4	100	30x3 $\frac{1}{2}$	595	595	850	895	
Chevrolet.....CWB	Ow.	4-3 $\frac{1}{2}$ x5 $\frac{1}{2}$	110	32x4	975	975	1575	1575	1575	Packard.....Single-Six	Ow.	6-3 $\frac{1}{2}$ x4 $\frac{1}{2}$	116	33x4 $\frac{1}{2}$	2350	2350	3125	3350	
Cleveland.....40	Ow.	6-3 $\frac{1}{2}$ x4 $\frac{1}{2}$	112	32x4	1295	1295	2195	2295	2295	Packard.....Twin Six	Ow.	12-3 $\frac{1}{2}$ x5	119	33x5	4850	4850	4850	6800	
Climber Four.....K	H-S.	4-3 $\frac{1}{2}$ x5	115	33x4	1385	1385	1385	1385	1385	Paige.....6-44	Ow.	6-3 $\frac{1}{2}$ x5	116	32x4	1635	1635	2450	2870	
Climber Six.....S	H-S.	6-3 $\frac{1}{2}$ x5	123 $\frac{1}{2}$	32x4 $\frac{1}{2}$	2250	2250	3000	3100	3100	Paige.....6-66	Cont.	6-3 $\frac{1}{2}$ x5	131	33x4	12975	13295	2875	3350	
Cole.....870	Nort.	8-3 $\frac{1}{2}$ x4 $\frac{1}{2}$	125	33x5	2485	2485	3385	3685	3685	Pan American.....6-55	H-S.	6-3 $\frac{1}{2}$ x5	121	33x4	2000	2000	2100	2100	
Columbia Challenger.....D	Rut.	6-3 $\frac{1}{2}$ x5	115	32x4	1195	1195	1195	1195	1195	Parenti.....1921	Ow.	8-2 $\frac{1}{2}$ x4 $\frac{1}{2}$	125	32x4	2000	2000	3000	3000	
Columbia.....D-C&S	Cont.	6-3 $\frac{1}{2}$ x4 $\frac{1}{2}$	115	32x4	1475	1475	1475	2295	2350	Patonson.....650	Cont.	6-3 $\frac{1}{2}$ x4 $\frac{1}{2}$	120	33x4	1595	1625	2695	2695	
Comet.....C-53	Cont.	6-3 $\frac{1}{2}$ x5 $\frac{1}{2}$	125	33x4 $\frac{1}{2}$	2350	2450	3050	3050	3050	Peerless.....56-S-7	Ow.	8-3 $\frac{1}{2}$ x5	125	34x4 $\frac{1}{2}$	2280	2880	3500	3790	
Commonwealth.....44	H-S.	4-3 $\frac{1}{2}$ x5	117	32x4	1395	1395	2465	2465	2465	Piedmont.....4-30	Lye.	4-3 $\frac{1}{2}$ x5	116	32x3 $\frac{1}{2}$	970	970	970	970	
Crawford.....22-6-40	Cont.	6-3 $\frac{1}{2}$ x5 $\frac{1}{2}$	122 $\frac{1}{2}$	32x4	3000	3000	3000	4500	4500	Piedmont.....6-40	Cont.	6-3 $\frac{1}{2}$ x4 $\frac{1}{2}$	122	32x4	1285	1285	1285	1285	
Crow-Elkhart.....L63-65	Lye.	4-3 $\frac{1}{2}$ x5	117	32x3 $\frac{1}{2}$	1295	1295	1295	1295	1295	Pierce-Arrow.....6-40	Ow.	6-4 $\frac{1}{2}$ x5 $\frac{1}{2}$	138	33x5	7000	6500	6500	8500	
Crow-Elkhart.....S63-65	H-S.	6-3 $\frac{1}{2}$ x5	117	33x4	1545	1545	1545	2395	2395	Pierce-Arrow.....6-45	Testor	6-3 $\frac{1}{2}$ x5	120	32x4	1945	1945	2335	3400	
Daniels.....D-19	Ow.	8-3 $\frac{1}{2}$ x5 $\frac{1}{2}$	132	34x4 $\frac{1}{2}$	15350	15350	6250	6950	6950	Pilot.....6-50	H-S.	6-3 $\frac{1}{2}$ x5	126	32x4 $\frac{1}{2}$	2285	2285	3350	3400	
Davis.....61-67	Cont.	6-3 $\frac{1}{2}$ x4 $\frac{1}{2}$	120	33x4 $\frac{1}{2}$	1895	1795	2595	2595	2595	Porter.....6-40	Ow.	4-4 $\frac{1}{2}$ x6 $\frac{1}{2}$	142	35x5	6750	6750	7800	7800	
Dixie Flyer.....H-S-70	H-S.	4-3 $\frac{1}{2}$ x5	112	32x4	1195	1195	1395	1895	1895	Premier.....6-D	Ow.	6-3 $\frac{1}{2}$ x5 $\frac{1}{2}$	126 $\frac{1}{2}$	33x5	3790	3690	4690	5190	
Dodge Brothers.....6-80	Ow.	6-4 $\frac{1}{2}$ x5	132	33x5	985	985	1585	1785	1785	Premocor.....6-40 A	Falls.	6-3 $\frac{1}{2}$ x4 $\frac{1}{2}$	117	32x4	1295	1295	1945	1995	
Dorris.....6-80	Ow.	6-4 $\frac{1}{2}$ x5	132	33x5	14785	4785	5800	7190	7190	Raleigh.....A-6-60	H-S.	6-3 $\frac{1}{2}$ x5	122	32x4 $\frac{1}{2}$	2250	2250	3100	3200	
Dort.....19-14	D-Ly.	4-3 $\frac{1}{2}$ x5	108	31x4	985	985	1535	1685	1685	R & V Knight.....R	Ow.	4-3 $\frac{1}{2}$ x5	116	32x4	1850	1850	2650	2750	
Driggs.....A	Ow.	4-2 $\frac{1}{2}$ x4 $\frac{1}{2}$	104	30x3 $\frac{1}{2}$	1275	1275	1975	1975	1975	Ranger 22-4.....A-B-C-D	Ow.	6-3 $\frac{1}{2}$ x5 $\frac{1}{2}$	127	32x4 $\frac{1}{2}$	3350	3350	4000	4200	
Du Pont.....A	Ow.	4-3 $\frac{1}{2}$ x5 $\frac{1}{2}$	124	32x4 $\frac{1}{2}$	3400	3400	4500	4900	4900	Ranger 22-6.....A-B-C-D	Ow.	6-3 $\frac{1}{2}$ x5	123	32x4	3550	3550	4000	4200	
Durant.....A-22	Ow.	4-3 $\frac{1}{2}$ x4 $\frac{1}{2}$	109	31x4	890	890	1365	1365	1365	Reo Series.....B, T & U	Ow.	6-3 $\frac{1}{2}$ x5	120	33x4	1650	1650	2700	2750	
Earl.....40	Ow.	4-3 $\frac{1}{2}$ x5 $\frac{1}{2}$	112	32x4	1375	1285	1995	1995	1995	ReVer.....6-54-E	Dues.	6-3 $\frac{1}{2}$ x5 $\frac{1}{2}$	128	32x4	2750	2485	33950	3650	
Elcar.....K-4	Lye.	4-3 $\frac{1}{2}$ x5	117	33x4	1145	1145	1195	1545	1645	Roamer.....6-54-E	Dues.	4-4 $\frac{1}{2}$ x6	128	32x4	3850	3650	44750	4750	
Elcar.....7-R	Cont.	6-3 $\frac{1}{2}$ x4 $\frac{1}{2}$	117	33x4	1595	1595	2395	2495	2495	Rolls-Royce.....EG-60	Ow.	6-3 $\frac{1}{2}$ x5 $\frac{1}{2}$	126 $\frac{1}{2}$	33x4 $\frac{1}{2}$	3350	3350	41750	41750	
Elgin.....K-1	Falls.	6-3 $\frac{1}{2}$ x4 $\frac{1}{2}$	118	33x4	1595	1495	2395	2395	2395	Romer.....Cont.	Cont.	6-3 $\frac{1}{2}$ x4 $\frac{1}{2}$	120	33x4	1975	1975	2050	2700	
Essex.....Ow.	Ow.	4-3 $\frac{1}{2}$ x5	108 $\frac{1}{2}$	32x4	1195	1195	1495	1995	1995	Saxon.....125	Ow.	4-3 $\frac{1}{2}$ x5	112	32x4	1295	1295	1995	1995	
Falcon.....4	Ow.	4-3 $\frac{1}{2}$ x5	115	32x4	1295	1295	1995	2085	2085	Sayers Six.....DP	Cont.	6-3 $\frac{1}{2}$ x4 $\frac{1}{2}$	118	33x4	1795	1795	2695	2695	
Falcon.....6	Ow.	6-3 $\frac{1}{2}$ x5	115	32x4	1595	1595	2295	2395	2395	Seneca.....L & O	Leit.	4-3 $\frac{1}{2}$ x4 $\frac{1}{2}$	104	30x3 $\frac{1}{2}$	1045	1045	2100	2290	
Fergus.....S-5-21	Ow.	6-3 $\frac{1}{2}$ x5	126	33x4 $\frac{1}{2}$															



## Specifications of Current Motor Truck Models

NAME AND MODEL	Tons Capacity	Chassis Price	Bore and Stroke	TIRES	Final Drive	NAME AND MODEL	Tons Capacity	Chassis Price	Bore and Stroke	TIRES	Final Drive	NAME AND MODEL	Tons Capacity	Chassis Price	Bore and Stroke	TIRES	Final Drive			
				Front	Rear					Front	Rear					Front	Rear			
Acason, R	1	\$1650	3 1/2 x 5	34x5 1/2	34x5 1/2	W	Corbitt, H	1	\$1800	3 1/2 x 5	35x5 1/2	35x5 1/2	B	Garford, 77D	3 1/2	\$4300	4 1/2 x 6	36x5	36x6d	W
Acason, RB	1	2200	3 1/2 x 5 1/2	36x5 1/2	36x5	W	Corbitt, E	1	2200	3 1/2 x 5	34x3 1/2	34x4	W	Garford, 68D	5	5200	5 x 6 1/2	36x6	40x6d	W
Acason, H	1 1/2	2450	3 1/2 x 5 1/2	36x3 1/2	36x5	W	Corbitt, C	1 1/2	2600	3 1/2 x 5	36x3 1/2	36x5	W	Garford, 150-A	7 1/2	5500	5 1/2 x 6 1/2	36x6	40x7d	W
Acason, L	2 1/2	3205	4 1/2 x 5 1/2	36x4	36x8*	W	Corbitt, B	2	3150	4 1/2 x 5 1/2	36x3 1/2	36x7	W	Gary, F	1	2100	3 1/2 x 5	36x3 1/2	36x5	W
Acason, M	5	5250	5 x 6 1/2	36x6	40x12	W	Corbitt, A	2 1/2	3300	4 1/2 x 5 1/2	36x4	36x7	W	Gary, I	1 1/2	2550	4 x 5 1/2	36x4	36x7	W
Ace, C	1 1/2	2295	3 1/2 x 5 1/2	34x3 1/2	34x5*	W	Corbitt, AA	3 1/2	4100	4 1/2 x 5 1/2	36x5	36x10	W	Gary, J	2 1/2	3150	4 1/2 x 5 1/2	36x4	40x5d	W
Ace, A	2 1/2	2795	3 1/2 x 5 1/2	36x4*	36x7	W	Day-Elder, A	1	1600	3 1/2 x 5	34x3 1/2	34x4	W	Gary, K	5	5150	5 x 6 1/2	36x6	40x6d	W
Acme, G	1	.....	3 1/2 x 5	35x5 1/2	35x5 1/2	W	Day-Elder, B	1 1/2	2000	3 1/2 x 5	34x3 1/2	34x5	W	Gersix, M	1 1/2	3100	4 x 5 1/2	36x3 1/2	36x7	W
Acme, B	1	.....	3 1/2 x 5	34x3 1/2	34x5	W	Day-Elder, C	2	2400	4 1/2 x 5 1/2	36x4	36x7	W	Gersix, K	2 1/2	3500	4 1/2 x 5 1/2	36x4	36x8	W
Acme, F	1 1/2	.....	4 1/2 x 5	34x4	34x5	W	Day-Elder, D	2 1/2	2750	4 1/2 x 5 1/2	36x4	36x7	W	Golden West, GH	3 1/2	4500	4 1/2 x 6	36x5	40x12	W
Acme, A	2	.....	4 1/2 x 5 1/2	36x4	36x7*	W	Day-Elder, E	3 1/2	3150	4 1/2 x 5 1/2	36x5	36x5d	W	Golden West, G	3 1/2	5000	4 1/2 x 5 1/2	36x6	36x6	W
Acme, AC	2 1/2	.....	4 1/2 x 5 1/2	36x5	40x10	W	Day-Elder, F	5	4250	4 1/2 x 5 1/2	36x5*	40x6d*	W	Graham Bros. A	1 1/2	2195	3 1/2 x 5	36x5 1/2	36x6 1/2	I
Acme, C	3 1/2	.....	4 1/2 x 5 1/2	36x6	40x12	W	Dearborn, E	1	1700	3 1/2 x 5 1/2	35x5 1/2	35x5 1/2	W	Gramm-Bern, 10	1	1365	3 1/2 x 5	36x5 1/2	36x6 1/2	I
Alr'n Multi-Trk20	1 1/2	1095	4 x 5 1/2	34x4	34x5	B	Dearborn, FX	1 1/2	2300	3 1/2 x 5 1/2	34x4	34x5	W	Gramm-Bern, 15	1 1/2	2050	3 1/2 x 5	36x3 1/2	36x5*	I
American, 25	2	3350	4 x 6	36x4*	36x4d*	W	Dearborn, F	1 1/2	2180	3 1/2 x 5 1/2	34x4*	34x5*	W	Gramm-Bern, 65	1 1/2	2725	3 1/2 x 5	36x3 1/2	36x5	W
American, 40	4	4275	4 1/2 x 6	36x5*	36x5d*	W	Dearborn, 48	2	2590	3 1/2 x 5 1/2	35x5 1/2	34x7*	W	Gramm-Bern, 20	2	3175	4 1/2 x 5 1/2	36x4*	36x7*	W
Apex, G	1	1450	3 1/2 x 5	33x5 1/2	33x5 1/2	I	Defiance, G	1	1695	3 1/2 x 5	35x5 1/2	35x5 1/2	I	Gramm-Bern, 25	2 1/2	3575	4 1/2 x 5 1/2	36x4*	36x4d*	W
Apex, D	1 1/2	1915	3 1/2 x 5 1/2	34x3 1/2	34x4	I	Defiance, D	1 1/2	2095	3 1/2 x 5	35x5 1/2	36x6	I	Gramm-Bern, 35	3 1/2	4375	4 1/2 x 5 1/2	36x5	40x5d*	W
Apex, E	2 1/2	2695	4 1/2 x 5 1/2	36x4	36x7	I	Defiance, E	2	2275	3 1/2 x 5	35x5 1/2	38x7*	I	Gramm-Bern, 50	5	5275	4 1/2 x 6	36x6	40x6d*	W
Apex, F	3 1/2	3975	4 1/2 x 6	36x5	36x10	I	DeKalb, E2 1/2	2 1/2	2600	4 1/2 x 5 1/2	36x4*	36x6*	W	Hahn, J4	1	.....	3 1/2 x 5	34x5*	34x5*	W
Armleder, 20	1	.....	3 1/2 x 5 1/2	34x3 1/2	34x5*	W	DeKalb, E2	2 1/2	2250	4 1/2 x 5 1/2	34x3 1/2	36x5*	W	Hahn, CD	1 1/2	.....	4 1/2 x 5 1/2	36x3 1/2	36x6*	W
Armleder, HW	1 1/2	.....	4 1/2 x 5 1/2	36x4*	36x7*	W	DeMartini, 1 1/2	1 1/2	2600	3 1/2 x 5	34x3 1/2	34x6	W	Hahn, EE	2 1/2	.....	4 1/2 x 5 1/2	36x3 1/2	36x6*	W
Armleder, KW	3 1/2	.....	4 1/2 x 6	36x5	36x5d	W	DeMartini, 2	2	3300	4 x 5 1/2	36x3 1/2	36x7	W	Hahn, F	3 1/2	.....	4 1/2 x 5 1/2	36x5*	36x10*	W
Atco, B	1 1/2	.....	3 1/2 x 5 1/2	34x3 1/2	36x6*	W	DeMartini, 3	3	4250	4 1/2 x 5 1/2	36x4	36x10	W	Hahn, EF	5	.....	4 1/2 x 6	36x6	40x12	W
Atco, B1	1 1/2	.....	3 1/2 x 5 1/2	34x3 1/2	36x6*	W	DeMartini, 4	4	4800	4 1/2 x 6	36x5	36x12	W	Hal-Fur, E	1	2200	4 x 5	35x5 1/2	35x5 1/2	W
Atco, A	2 1/2	.....	4 1/2 x 5 1/2	36x4*	36x8*	W	Denby, 31	1 1/2	1625	3 1/2 x 5	35x5	35x5	B	Hal-Fur, B	1 1/2	3000	4 1/2 x 5 1/2	35x5*	38x7*	W
Atlas, M.D.	1	1185	3 1/2 x 5	32x4 1/2	32x4 1/2	W	Denby, 33	1 1/2	2300	3 1/2 x 5	35x5	38x7*	I	Hal-Fur, F	3 1/2	4000	4 1/2 x 5 1/2	36x6*	40x10*	W
Atterbury, 20R	1 1/2	2475	3 1/2 x 5	34x3 1/2	34x5	W	Denby, 34	2	2600	3 1/2 x 5	36x3 1/2	36x6	I	Hall, 1 1/2	1 1/2	3100	3 1/2 x 5	34x5*	38x7*	W
Atterbury, 7CX	2 1/2	3175	4 1/2 x 5 1/2	36x4	36x4d	W	Denby, 25	3	3300	4 1/2 x 5 1/2	36x4	36x7	I	Hall, 2 1/2	2 1/2	3275	4 1/2 x 5 1/2	36x4	36x6	W
Atterbury, 7D	2 1/2	3975	4 1/2 x 5 1/2	36x5	40x5d	W	Denby, 27	4	4200	4 1/2 x 5 1/2	36x5	36x5d	I	Hall, 3 1/2	3 1/2	4100	4 1/2 x 5 1/2	36x5	36x5d	W
Atterbury, 8E	5	4975	4 1/2 x 6	36x5	40x6d	W	Denby, 210	5	4850	4 1/2 x 5 1/2	36x6	40x6d	I	Hall, 5	5	5100	4 1/2 x 5 1/2	36x5	40x6d	W
Autocar, 21UF	1 1/2	2300	3 1/2 x 5	34x4*	34x5*	D	Dependable, A	1 1/2	1650	3 1/2 x 5 1/2	34x5	36x6	W	Hall, 7 chain	7	5100	4 1/2 x 5 1/2	36x5	40x6d	C
Autocar, 21UG	1 1/2	2400	4 1/2 x 5 1/2	34x4*	34x5*	D	Dependable, C	1 1/2	2350	3 1/2 x 5 1/2	34x3 1/2	34x5	W	Harvey, WEA	1 1/2	2550	4 1/2 x 5 1/2	34x3 1/2	34x5	W
Autocar, 26Y	.....	4350	4 1/2 x 5 1/2	34x6	36x12	D	Dependable, D	2	2650	1 x 6 1/2	34x5	36x6	W	Harvey, WOA	2	2950	4 1/2 x 5 1/2	34x4	34x7	W
Autocar, 26-B	.....	4500	4 1/2 x 5 1/2	34x6	36x12	D	Dependable, E	2 1/2	2950	4 1/2 x 5 1/2	36x4	36x7	W	Harvey, WFA	2 1/2	3300	4 1/2 x 5 1/2	36x4	36x7	W
Available, H1 1/2	1 1/2	2175	4 x 5 1/2	36x3 1/2	36x5*	W	Dependable, G	3 1/2	3550	4 1/2 x 6	36x6	38x7	W	Harvey, WHA	3 1/2	3950	4 1/2 x 6	36x5	36x5d	W
Available, H2	2	2775	4 x 5 1/2	36x3 1/2	36x6*	W	Diamond T, O	1	1975	3 1/2 x 5 1/2	34x5*	36x6*	W	Harvey, WKA	5	4500	4 1/2 x 6	36x6	40x6d	W
Available, H2 1/2	2 1/2	3475	4 x 5 1/2	36x4*	36x8*	W	Diamond T, FS	1 1/2	2525	3 1/2 x 5 1/2	36x3 1/2	36x5	W	Hawkeye, K	1 1/2	1850	3 1/2 x 5 1/2	34x3 1/2	34x5*	I
Available, H3 1/2	3 1/2	4475	4 1/2 x 5 1/2	36x5	40x5d	W	Diamond T, T	1 1/2	2250	3 1/2 x 5 1/2	36x3 1/2	36x5	W	Hawkeye, M	2	2650	4 1/2 x 5 1/2	36x4*	36x6*	I
Available, H5	5	5375	4 1/2 x 6	36x6	40x12	W	Diamond T, U	2	2650	4 x 5 1/2	36x4	36x7	W	Hawkeye, N	3 1/2	3700	4 1/2 x 5 1/2	36x5*	36x10*	I
Available, H7	7	6000	5 x 6	36x6	40x14	B	Diamond T, KL	3 1/2	3750	4 1/2 x 5 1/2	36x5	38x5d	W	Hendrickson, N	2 1/2	3150	4 1/2 x 5 1/2	36x4*	36x7*	W
Avery	1	.....	3 x 4	34x5 1/2	34x5 1/2	I	Diamond T, S	5	4500	4 1/2 x 6	36x6	40x6d	W	Hendrickson, M	3 1/2	3975	4 1/2 x 5 1/2	36x5*	36x5d*	W
Beck, A Jr.	1	1950	3 1/2 x 5	34x3 1/2	34x4	I	Diehl, A	1	.....	3 1/2 x 5	34x4*	35x5	I	Huffman, B	1 1/2	1995	3 1/2 x 5	34x3 1/2	34x6	W
Beck, C	2	2550	4 1/2 x 5 1/2	36x4	36x6	W	Diehl, B	1 1/2	.....	3 1/2 x 5	36x6	36x6	I	Huffman, C	1 1/2	1795	3 1/2 x 5	34x3 1/2	34x6	W
Bell, M	1	1495	3 1/2 x 5	35x5	35x5 1/2	W	Dispatch, F	1	1350	3 1/2 x 5	34x4*	34x4*	I	Hurlburt A	1 1/2	2850	4 x 5 1/2	34x4	34x5	W
Bell, E	1 1/2	2100	3 1/2 x 5 1/2	34x3 1/2	34x5 1/2	W	Doane	2 1/2	4100	4 1/2 x 5 1/2	36x5	36x7	C	Hurlburt B	2 1/2	3750	4 1/2 x 5 1/2	36x4	36x4d	W
Bell, O	2 1/2	2550	4 1/2 x 5 1/2	34x4	34x6	W	Doane	3	5100	4 1/2 x 5 1/2	36x5	36x5d	C	Hurlburt C	3 1/2	4590	4 1/2 x 6	36x5	36x5d	W
Belmont, D	2 1/2	2675	3 1/2 x 5	34x3 1/2	34x6*	D	Doane	6	6000	5 x 6 1/2	36x6	40x6d	C	Hurlburt D	5	5500	4 1/2 x 6	36x5	40x6d	W
Belmont, F	3 1/2	3525	4 x 6	36x5*	36x5d*	D	Dodge Brothers	1 1/2	885	3 1/2 x 5 1/2	32x4*	32x4*	B	Indep'd't (Iowa), B	1	1665	3 1/2 x 5	34x3 1/2	34x4	W
Bessemer, G	1 1/2	1395	3 1/2 x 5	35x5 1/2	35x5 1/2	I	Dorris, K-1	2-2 1/2	3100	4 1/2 x 5 1/2	36x4	36x7	W	Indep'd't (Ia.), H.I	1 1/2	2040	4 1/2 x 5 1/2	34x3 1/2	34x5	I
Bessemer, H-2	1 1/2	1905	3 1/2 x 5	34x3 1/2	36x5	I	Dorris, K-7	3 1/2	4400	4 1/2 x 5 1/2	36x5	36x10	W	Indep'd't (Ohio), F	2 1/2	2940	4 1/2 x 5 1/2	34x4	34x6	W
Bessemer, J-2	2 1/2	2595	4 1/2 x 5 1/2	36x4	36x4d	I	Dort, 103	3 1/2	685	3 1/2 x 5	31x4	31x4	B	Indep'd't (Ohio), H	2 1/2	3085	4 1/2 x 5 1/2	36x4	36x4d	W
Be semer, K-2	4	3195	4 1/2 x 5 1/2	36x5	36x10	I	Double Drive B	3	4000	4 1/2 x 5 1/2	36x6	36x6	W	Indep'd't (Ohio), K	3 1/2	3985	4 1/2 x 5 1/2	36x5	36x5d	W
Big 4, H	3 1/2-4	5000	4 1/2 x 6	36x6	36x6	W	Douglas G	1 1/2	1850	3 1/2 x 5 1/2	36x5	37x8*	W	Indiana, 12	1 1/2	1745	3 1/2 x 5 1/2	34x3 1/2	34x5*	W
Big 4, T	4	5500	4 1/2 x 6	36x6	36x6	W	Douglas I	3	2950	4 1/2 x 5 1/2	36x6	37x8*	W	Indiana, 20	2	2850	4 1/2 x 5 1/2	36x4*	36x7*	W
Big 4, K	7	6000	5 1/2 x 6	36x6	36x6	W	Duplex, A	1 1/2	2775	4 x 5 1/2	35x5 1/2	38x7*	I	Indiana, 25	2 1/2	3375	4 1/2 x 5 1/2	36x4*	36x8*	W
Big 4, HA	7	6000	5 1/2 x 6	36x6	36x10	W	Duplex, E	3 1/2	4250	4 1/2 x 5 1/2	36x8	36x8	I	Indiana, 35	3 1/2	4085	4 1/2 x 5 1/2	36x5*	36x5d*	W
Brinton, F	2 1/2	2270	3 1/2 x 5 1/2																	

## Specifications of Current Motor Truck Models—Continued

NAME AND MODEL	Tons Capacity	Chassis Price	Bore and Stroke	TIRES	Final Drive	NAME AND MODEL	Tons Capacity	Chassis Price	Bore and Stroke	TIRES	Final Drive	NAME AND MODEL	Tons Capacity	Chassis Price	Bore and Stroke	TIRES	Final Drive
				Front	Rear					Front	Rear					Front	Rear
Kelly-S, K-45	4	\$4550	4 1/2 x 6 1/2	36x5	40x6d	O. K., K1	1 1/2	\$2675	4 x 5 1/2	36x3 1/2	36x5	Signal, R	5	\$4400	4 1/2 x 6	36x6	40x6d
Kelly-S, K-50	5	4900	4 1/2 x 6 1/2	36x6	40x6d	O. K., L1	2 1/2	3450	4 1/2 x 5 1/2	36x4	36x8	Southern, 10	1	2090	3 1/2 x 5	31x3 1/2	31x4
Kelly-S, K-60	6	5100	4 1/2 x 6 1/2	36x6	40x7d	O. K., M1	3 1/2	4250	4 1/2 x 6	36x5	36x5d	Southern, 15	1 1/2	2500	3 1/2 x 5 1/2	36x6 1/2	34x4
Keystone, 40	2	2450	3 1/2 x 5 1/2	34x5 1/2	38x7 1/2	Ogden, A1	1 1/2	2375	3 1/2 x 5 1/2	36x3 1/2	36x5	Southern, 20	2	2900	3 1/2 x 5 1/2	36x6 1/2	40x8*
Kimball, AB	2 1/2	3675	4 x 6	36x4	36x7	Ogden, E	2 1/2	2975	3 1/2 x 5 1/2	36x4	36x7	Standard, 1-K	1-1 1/2	1800	3 1/2 x 5	34x3 1/2	34x5*
Kimball, AC	3	3975	4 1/2 x 6	36x4	36x8	Old Hickory, W	1 1/2	2175	3 1/2 x 5	36x3 1/2	36x4*	Standard, 76	2 1/2	2400	4 1/2 x 5 1/2	36x4*	36x7*
Kimball, AK	3 1/2	4500	4 1/2 x 6	36x4	36x10	Old Reliable, A	1 1/2	2350	4 x 5	34x4	36x6	Standard, 66	3 1/2	3150	4 1/2 x 5 1/2	36x5	36x10
Kimball, AE	4	5000	4 1/2 x 6	36x5	40x12	Old Reliable, B	2 1/2	3500	4 1/2 x 6	34x4	36x1d	Standard, 5-K	5-7	4400	4 1/2 x 6	36x6	40x12
Kimball, AF	5	5300	5 x 6	36x6	40x7d	Old Reliable, C	3 1/2	4250	4 1/2 x 6	36x5	36x5d	Sterling, 1 1/2	1 1/2	2885	4 x 5 1/2	36x3 1/2	36x5*
Kissel, Express	1	1935 1/2	3 1/2 x 5 1/2	34x5 1/2	34x5 1/2	Old Reliable, D	5	5250	4 1/2 x 6	36x6	40x6d	Sterling, 2 1/2	2 1/2	3085	4 x 5 1/2	36x4	36x6
Kissel, Utility	1 1/2	1975	3 1/2 x 5 1/2	36x3 1/2	36x5	Old Reliable, E	7	6000	4 1/2 x 6 1/2	36x6	40x7d	Sterling, 3 1/2	3 1/2	3290	4 1/2 x 5 1/2	36x4*	36x4d
Kissel, Freight	2 1/2	2375	4 1/2 x 5 1/2	36x4	36x7	Old Reliable, F	1	1095	3 1/2 x 5 1/2	35x5 1/2	35x5 1/2	Sterling, 5-W	5	4950	5 x 6 1/2	36x6*	40x6d*
Kissel, H. D.	4	3675	4 1/2 x 5 1/2	36x5	36x5d	Olympic, A	2 1/2	3500	3 1/2 x 5	36x4	36x7	Sterling, 5-C	5	5500	5 x 6 1/2	36x6	40x6d
Kleiber, AA	1	2900	4 1/2 x 5 1/2	31x3 1/2	34x5*	Oshkosh, A	2	3750	3 1/2 x 5	36x6 1/2	36x6 1/2	Sterling, 7 1/2	7 1/2	6000	5 x 6 1/2	36x6	40x7d
Kleiber, AB	1 1/2	3100	4 1/2 x 5 1/2	31x3 1/2	36x6*	Oshkosh, AA	2	3850	3 1/2 x 5	36x6 1/2	36x6 1/2	Stewart, 14	1 1/2	1395	3 1/2 x 5 1/2	32x4 1/2	32x4 1/2
Kleiber, BB	2	3600	4 1/2 x 5 1/2	36x4*	36x7*	Oshkosh, B	2 1/2	4150	4 x 5 1/2	38x7 1/2	38x7 1/2	Stewart, 15	1 1/2	1875	3 1/2 x 5 1/2	35x5 1/2	35x5 1/2
Kleiber, BC	2 1/2	3950	4 1/2 x 5 1/2	36x5*	36x8*	Oshkosh, BB	2 1/2	4300	4 x 5 1/2	38x7 1/2	38x7 1/2	Stewart, 9	1 1/2	2200	3 1/2 x 5	34x3 1/2	34x5
Kleiber, C	3	4600	5 x 6 1/2	36x5	36x5d	Packard, EC	1 1/2-3	3500	4 1/2 x 5 1/2	36x4	36x7	Stewart, 7	2	2800	4 1/2 x 5 1/2	34x4	34x7
Kleiber, D	5	5300	5 x 6 1/2	36x6	40x12	Packard, EX	1 1/2-3	4000	4 1/2 x 5 1/2	36x5 1/2	40x8 1/2	Stewart, 7-X	2 1/2	2950	4 1/2 x 5 1/2	34x4	34x7
Koehler, M	1 1/2	1995	3 1/2 x 5	34x3 1/2	34x5	Packard, ED	2-4 1/2	4100	4 1/2 x 5 1/2	36x5	36x5d	Stewart, 10	2 1/2	3850	4 1/2 x 5 1/2	36x5	36x5d
Koehler, D	2 1/2	3175	4 x 5 1/2	36x4	36x7	Packard, EF	4-7 1/2	4500	5 x 5 1/2	36x6	40x6d	Stewart, 10-X	3 1/2	3850	4 1/2 x 5	36x5	36x5d
Koehler, MCS	2 1/2	3275	4 x 5 1/2	36x4	36x7	Paige, 52-19	1 1/2	2880	4 x 5 1/2	34x3 1/2	34x5	Stoughton, C	3 1/2	1240	3 1/2 x 5	34x4 1/2	34x4 1/2
Koehler, F	3 1/2	4150	4 x 5 1/2	36x5	36x10	Paige, 54-20	2 1/2	3400	4 1/2 x 5 1/2	34x4	34x8	Stoughton, A	1 1/2	1995	3 1/2 x 5 1/2	34x4 1/2	35x5 1/2
Koehler, MT, Trac	5	3275	4 x 5 1/2	36x4	36x7	Paige, 51-18	3 1/2	4285	4 1/2 x 5 1/2	36x5	36x5d	Stoughton, B	1 1/2	2350	3 1/2 x 5 1/2	36x3 1/2	36x5
Lange, B	2 1/2	3350	4 1/2 x 5 1/2	36x4*	36x7*	Parker, F20	2	3500	4 x 6	34x4	36x1d	Stoughton, D	2	2800	4 x 5 1/2	36x4	36x7
Larrabee, X-Z	3 1/2-1	1925	3 1/2 x 4 1/2	34x5 1/2	34x5 1/2	Parker, J20	3 1/2	4400	4 1/2 x 6	36x5	40x5d	Stoughton, F	3	3600	4 1/2 x 5 1/2	36x5d	36x5d
Larrabee, U	1 1/2	2400	3 1/2 x 4 1/2	34x3 1/2	31x5	Parker, M20	5	5500	4 1/2 x 6	36x6	40x6d	Sullivan, E	2	3350	4 1/2 x 5 1/2	36x4*	36x7*
Larrabee, K	1 1/2	3200	3 1/2 x 4 1/2	36x4	36x7	Patriot, Reverse	1	1500	3 1/2 x 5	35x5 1/2	35x5 1/2	Sullivan, H	3 1/2	4650	4 1/2 x 6	36x5	36x5d
Larrabee, L-4	3 1/2	4000	4 1/2 x 5 1/2	36x5	36x5d	Patriot, Lincoln	2	2050	4 x 5 1/2	34x3 1/2	34x5	Superior, D	1	1650	3 1/2 x 5	34x4	34x4
Larrabee, W	5	4900	4 1/2 x 6	36x6	40x6d	Patriot, Washg'tn	3	2900	4 1/2 x 5 1/2	36x4	36x7	Superior, E	2	2600	3 1/2 x 5 1/2	36x4	36x6
Luedinghaus, C	1	1695	3 1/2 x 5	35x5 1/2	35x5 1/2	Piedmont, 4-30	1	1200	3 1/2 x 5	34x4 1/2	34x4 1/2	Super Truck, 50	2 1/2	3300	4 x 6	36x4	36x8
Luedinghaus, W	1 1/2	2490	3 1/2 x 5 1/2	34x3 1/2	31x5*	Pierce-Arrow	2	3200	4 x 5 1/2	36x4	36x1d	Super Truck, 70	3 1/2	4300	4 1/2 x 6	36x5	40x5d
Luedinghaus, K	2-2 1/2	3150	4 1/2 x 6 1/2	36x4*	36x7*	Pierce-Arrow	3 1/2	4350	4 1/2 x 6 1/2	36x5	36x5d	Super Truck, 100	5	5300	4 1/2 x 6	36x5	40x12
						Pierce-Arrow	5	4850	4 1/2 x 6 1/2	36x5	40x6d	Super Truck, 150	7 1/2	6300	5 x 6	36x6	40x7d
						Pioneer, 59	1	1550	3 1/2 x 4 1/2	32x4 1/2	32x4 1/2						
						Pittsburgh, C-21	3	3800	4 1/2 x 5 1/2	36x5*	36x7*	Texas, A35	3 1/2	1095	3 1/2 x 5	33x4	33x4
						Power, F	2	3400	4 1/2 x 5 1/2	36x6	36x6	Texas, TK39	1 1/2	1550	3 1/2 x 5	36x6	38x7
						Power, C	3 1/2	4500	4 1/2 x 5 1/2	36x5	40x10	Tiffin, GW	1 1/2	2400	4 1/2 x 5 1/2	36x3 1/2	36x5
						Premcar, B-143	1 1/2	2475	3 1/2 x 5	36x6 1/2	36x6 1/2	Tiffin, MW	2 1/2	3100	4 1/2 x 5 1/2	36x4	36x3 1/2
												Tiffin, PW	2 1/2	4100	4 1/2 x 5 1/2	36x5	40x5d
												Tiffin, F50	5	4800	4 1/2 x 6	36x6	40x6d
												Tiffin, F60	6	5000	4 1/2 x 6	36x6	40x12
												Titan, HT	3 1/2	4550	4 1/2 x 6	36x4*	40x5d
												Titan, HD	5	5400	4 1/2 x 6	36x5	40x6d
												Titan, TS	2 1/2	3100	4 1/2 x 5 1/2	34x4*	36x4d
												Tower, J	1 1/2	2900	4 1/2 x 5 1/2	35x5	38x7
												Tower, H	1 1/2	3200	4 1/2 x 5 1/2	36x4	36x7
												Tower, G	3 1/2	4100	4 1/2 x 5 1/2	36x5	36x5d
												Traffic, C	...	1595	3 1/2 x 5	34x3 1/2	34x5*
												Traffic	3	1895	3 1/2 x 5	36x4	36x7
												Transport, 20	1 1/2	1395	3 1/2 x 5 1/2	34x3 1/2	34x4
												Transport, 30	1 1/2	1995	3 1/2 x 5 1/2	36x3 1/2	36x5
												Transport, 50	2 1/2	2785	4 1/2 x 5 1/2	36x4	36x7
												Transport, 70	3 1/2	3885	4 1/2 x 5 1/2	36x5	36x10
												Traylor, B	1 1/2	2390	3 1/2 x 5 1/2	34x3 1/2	34x5
												Traylor, C	2	2850	4 x 5 1/2	36x4	36x7
												Traylor, D	3	3300	4 1/2 x 5 1/2	36x4	36x8*
												Traylor, E	4	4450	4 1/2 x 6	35x5	40x10
												Triangle, AA	5-7	4700	4 1/2 x 6	36x6	40x6d
												Triangle, A	1 1/2	1385	3 1/2 x 5	34x4 1/2	34x4 1/2
												Triangle, C	2	2350	3 1/2 x 5 1/2	34x3 1/2	34x6*
												Triangle, G	2	2700	3 1/2 x 5 1/2	36x4*	36x6*
												Triumph, B	2 1/2	2950	4 x 5 1/2	36x4*	36x7*
												Triumph, G	1	1995	3 1/2 x 5	34x5 1/2	34x5 1/2
												Triumph, HC	1 1/2	2550	3 1/2 x 5 1/2	36x3 1/2	36x5
												Twin City, B.W.	2	2900	3 1/2 x 5 1/2	36x4	36x7
												Twin City, A.W.	2	2750	4 x 5 1/2	36x4	36x7
												Twin City, A	3 1/2	4000	4 1/2 x 6	36x5	40x5d
												Twin City, B	5	5160	5 1/2 x 6	36x6	36x6
												Twin City, A	5	5160	5 1/2 x 6	36x7	36x7
												Ultimate, A	2	3200	4 x 5 1/2	36x3 1/2	36x6*
												Ultimate, A.J.	2	3250	4 1/2 x 5 1/2	35x5 1/2	38x7 1/2
												Ultimate, A.J.	2	3300	4 1/2 x 5 1/2	36x3 1/2	36x6
												Ultimate, B	3	3750	4 1/2 x 5 1/2	36x4*	36x4d*
												Ultimate, BL	3	3850	4 1/2 x 5 1/2	36x4*	36x4d*
												Union, F.W.	2 1/2	3190	4 x 6	36x5*	36x8*
												Union, H.W.	4	4185	4 1/2 x 6	36x6	40x12
												Union, J.W.	6	5800	5 x 6	36x6	40x14
												United, A	1 1/2	2145	3 1/2 x 5 1/2	36x3 1/2	34x5*
												United, B	2 1/2	3150	4 1/2 x 5 1/2	36x4*	



## Specifications of Current Motor Truck Models—Continued

NAME AND MODEL	Tons Capacity	Chassis Price	Bore and Stroke	TIRES		Final Drive	NAME AND MODEL	Tons Capacity	Chassis Price	Bore and Stroke	TIRES		Final Drive	NAME AND MODEL	Tons Capacity	Chassis Price	Bore and Stroke	TIRES		Final Drive
				Front	Rear						Front	Rear						Front	Rear	
Ward-LaF., 4A	3½	\$4890	4½x6½	36x5	36x5d	W	Wichita, RX	2½	\$3600	4½x6	36x4*	36x8*	W	Winther, 751	1	\$1795	3½x5	34x4½†	35x5†	I
Ward-LaF., 5A	5	5590	5 x6½	36x6	40x6d	W	Wichita, O	3½	4000	4½x6	36x5*	36x5d*	W	Winther, 430	1½	2850	3½x5	32x4	32x4	I
Watson, E	1	1785	3½x5½	35x5†	35x5†	W	Wichita, S	5	5000	4½x6	36x6	40x6d	W	Winther, 39	1½	2150	3½x5	34x3½	34x5	I
Watson, N	3½	3825	4½x6½	36x5	36x10	W	Wilcox, AA	1	1900	3½x5½	36x4*	36x4*	W	Winther, 49	2	3250	4 x5	34x4	34x4d	I
Western, W1½	1½	2550	4½x5½	36x3½*	36x5*	W	Wilcox, BB	1½	2550	4½x5	36x4	36x5	W	Winther, 50	2½	3955	4 x6	38x7†	42x9†	I
Western, W1½	1½	2550	4½x5½	36x4	36x7	W	Wilcox, D	2½	3000	4½x5	36x4*	36x3½d*	W	Winther, 70	3½	4200	4 x6	36x5	36x5d	I
Western, W2½	2½	3250	4½x6½	36x5	36x7	W	Wilcox, E	3½	3950	4½x6	36x5*	36x5d*	W	Winther, 450	5	3690	4 x5	34x5	36x6	I
Western, W3½	3½	4250	4½x6½	36x5	40x5d	W	Wilcox, F	5	4350	4½x6½	36x5*	36x5d*	W	Winther, 109	7	5250	4½x6	36x6	40x5d	I
White, 15	2	2100	3½x5½	34x5†	34x5†	D	Wilson, EA	2½	2825	4½x5½	36x4	36x7	W	Winther, 140	7	5900	5 x6	36x6	40x7d	I
White, 20	2	3250	3½x5½	34x4*	36x7	D	Wilson, G	3½	3895	4½x5½	36x5	36x5d	W	Wisconsin, B	1	1950	4 x5½	34x5†	34x5†	W
White, 40	3½	4200	3½x5½	36x5	40x5d	D	Wilson, H	5	4520	4½x6	36x6	40x6d	W	Wisconsin, C	1½	2500	4½x6½	36x6†	36x6†	W
White, 45	5	4500	4½x6½	36x6	40x6d	D								Wisconsin, D	2½	3500	4½x6½	36x6	36x10	W
White Hick., E	1	1225	3½x5	34x5†	34x5†	W								Wisconsin, E	3½	4000	5 x6½	36x6†	36x12†	W
White Hick., H	1½	1375	3½x5	36x3½	36x5	W								Witt-Will, N	1½	2750	3½x5	36x3½*	36x5*	W
White Hick., K	1½	1675	4½x5½	36x4*	36x4*	W								Witt-Will, P	2½	3250	4½x5½	36x3½*	36x7*	W
Wichita, K	1	2300	3½x5½	36x3½*	36x5*	W								Wolverine, J	1	2125	3½x5½	34x3	34x4	I
Wichita, L	1½	2600	3½x5½	36x3½*	36x5*	W								Wolverine, J	1½	2375	3½x5	34x3½	34x5	I
Wichita, M	2	2800	3½x5½	36x3½*	36x6*	W								Wolverine, J	2	2840	3½x5	34x4	34x7	I
Wichita, R	2½	3000	3½x5½	36x4*	36x7*	W								Wolverine, L	2½	3425	4½x5½	36x5	36x10	I

\*2-cyl. †6-cyl. ‡8-cyl. All others, not marked, are 4-cyl.

Trac., Tractor. \*\*Canadian made.

Final Drive: W—Worm, I—Internal Gear, C—Chains, D—

Double Reduction, B—Bevel, 4—Four-Wheel, E—External

Gear. \*Tires—optional. †Pneumatic Tires. All others solid.

†Price includes body. §—Price includes several items of

equipment.

## Farm Tractor Specifications and Prices

TRADE NAME	Rating	Price	Wheels or Crawlers	Engine	Cylinders: Bore, Stroke	Fuel	Pump Capacity	TRADE NAME	Rating	Price	Wheels or Crawlers	Engine	Cylinders: Bore, Stroke	Fuel	Pump Capacity	TRADE NAME	Rating	Price	Wheels or Crawlers	Engine	Cylinders: Bore, Stroke	Fuel	Pump Capacity	
All-In One...	16-30	\$1975	3	Clim.	4-5 x6½	GDK	3-4	Grain Belt...A	18-36	\$2150	4	Wauk.	4-4½x6½	Gor K	4	Port Huron .A	12-25	\$1500	4	Chief	4-3½x6	G,K	3	
Allis-Chalm. B	6-12	925	2	LeR.	4-3½x4½	Gas.	1	Gray...1920	18-36	2000	3	Wauk.	4-4½x6½	Gas.	4	Prairie Dog. L	9-18	650	3	Wauk.	4-3½x5½	Gas.	2	
Allis-Chal.G.P	6-12	795	2	LeR.	4-3½x4½	Gas.	1-2	Ground Hog...	19-31	2000	4	Erd.	4-4 x6	Gor K	3	Prairie Dog. D	15-30	1250	4	Wauk.	4-4½x6½	Gas.	3	
Allis-Chalm. L	12-20	1350	2	Midw.	4-4½x6½	Gas.	2-3	Gt. Western St.	20-30	1950	4	Beav.	4-4½x6	K	4	Ranger Cul.	T-20	8-16	...	4	LeR.	4-3½x4½	Gas.	1
Allis-Chalm. M	18-30	2150	4	Own	4-4½x6½	Gor K	3-4	Hart-Parr...20	20	945	4	Own	2-5½x6½	K.D.	2	Reed...A	15-30	1985	4	Wauk.	4-4½x6½	Gor K	3-4	
Allis-Chalm. N	10-18	875	4	Own	4-4½x6½	G,K	4	Hart-Parr...30	30	1295	4	Own	2-6½x7	K.D.	3	Reed...A-I	18-36	2185	4	Wauk.	4-5 x6½	Gas.	4	
Allwork...2-G	14-28	1775	4	Own	4-4½x6½	Gor K	3	Heider...D	9-16	1170	4	Wauk.	4-4½x6½	G,K	2	Reliable...	10-20	885	4	Own	2-6 x7	Ker.	2	
Allwork...C	14-28	1525	4	Own	4-5 x6	Gor K	3	Heider...C	12-20	1395	4	Wauk.	4-4½x6½	G,K	3	Reliable...	12-25	1600	4	Wauk.	4-4½x6½	Gor K	3	
AndrewsKin.D	18-36	2500	4	Clim.	4-5 x6½	G,K	2-3	Heider...Cult	6-10	1050	4	LeR.	4-3½x4½	Gas.	1	Rex...	10-20	885	4	Wauk.	4-4½x6½	Gor K	3-4	
Appleton...	12-20	1500	4	Buda	4-4½x6½	G,K	2-3	Hicks...	20-30	...	4	...	4-4½x6	Kor G	4	Russell...	12-24	1500	4	Own	4-4½x6½	Gor K	3-4	
ARO...1921-22	3-5	495	4	Own	1-4½x5	Gas.	1	Huber Light 4.	12-25	1185	4	Wauk.	4-4½x6½	Gor K	3	Russell...	15-30	2200	4	Own	4-5 x6½	Gor K	2-3	
Aultman-T...	15-30	2200	4	Clim.	4-5 x6½	G,K	4	Huber Super 4	15-30	1885	4	Midw.	4-4½x6	Gas	3	Russell...	20-35	3000	4	Own	4-5½x7	Gor K	4-5	
Aultman-T...	22-45	3420	4	Own	4-5½x8	G,K	6	Illinois, Super...	18-30	...	4	Clim.	4-5 x6½	G,K	4	Russell...	30-60	5000	4	Own	4-8 x10	Gor K	8-10	
Aultman-T...	30-60	4500	4	Own	4-7 x9	G,K,D	8	Imperial...C	40-70	4500	4	Own	4-7½x9	G,K,D	10	Samson...M	...	...	4	Nor	4-4 x5½	G,K	2	
Automot. B-3.	12-21	1785	4	Here.	4-4 x5	Gas.	2-3	Indiana...F	5-10	895	2	LeR.	4-3½x4½	Gas.	1-2	Sandusky...J	10-20	1250	4	Own	4-4½x5½	G,K,D	2	
Avery,SR.Cul.	5-10	...	4	Own	4-3 x4	G,K	...	International...	8-16	900	4	Own	4-4½x5	G,K,D	2	Sandusky...E	15-35	1750	4	Own	4-5 x6½	G,K,D	4	
Avery...Cult-C	5-10	...	3	Own	6-3 x4	G,K	...	International...	15-30	1750	4	Own	4-4½x6	G,K,D	4	Shawnee Com.	6-12	...	2	LeR.	4-3½x4½	Gas.	1	
Avery...Cult-B	5-10	...	4	Own	6-3 x4	G,K	...	International...	15-30	1750	4	Own	4-4½x6	G,K,D	4	Shawnee Com.	9-18	...	2	Gray	4-3½x5	...	...	
Avery...C	8-16	...	4	Own	2-5½x6	G,K,D	2-3	J-T...N	20-40	...	2	Chief	4-4½x6	G,K,D	3-4	Shelby...D	15-30	...	4	Beav.	4-4½x6	G,K	3	
Avery...	12-20	...	4	Own	4-4½x6	G,K,D	2-3	J-T...N	20-40	...	2	Chief	4-4½x6	G,K,D	3-4	Shelby...C	10-20	...	4	Erd.	4-4 x6	Gor K	2-3	
Avery...	12-25	...	4	Own	2-6½x7	G,K,D	3-4	Klumb...F	16-32	1475	4	Clim.	4-5 x6½	...	...	Short Turn...	20-40	1500	3	Beav.	4-4½x6	G,K	3	
Avery...	14-28	...	4	Own	4-4½x7	G,K,D	3-4	Knudsen...1920	25-45	2500	4	Own	4-5 x9	Gas.	4-6	Steady Pull...	12-24	1485	4	Own	4-4 x5	Gas.	3	
Avery...	18-36	...	4	Own	4-5½x6	G,K,D	4-5	LaCrosse...M	6-12	650	4	Own	2-4 x6	G,K	1	Stinson...4E	18-36	1835	4	Beav.	4-4½x6	G,K	4	
Avery...	25-50	...	4	Own	4-6½x7	G,K,D	5-6	LaCrosse...G	12-24	985	4	Own	2-6 x7	Gor K	3	Stone...	20-40	2250	4	Beav.	4-4½x6	G,K	4	
Avery...	45-65	...	4	Own	4-7½x8	G,K,D	8-10	LaCrosse...G	12-24	1495	4	Midw.	4-4½x5½	Gas.	3	Tiga...	15-27	2625	4	Wisc.	4-4½x6	Gas.	3-4	
Bates...	15-25	...	4	Own	4-4½x6	Ker.	3	Lauson...5	12-25	1685	4	Beav.	4-4½x6	Gor K	3	Titan...	10-20	900	4	Own	2-6½x8	G,K,D	3	
Bates Mule. H	15-25	...	4	Midw.	4-4½x6½	Gas.	3	Lauson...20	15-25	1885	4	Beav.	4-4½x6	Gor K	3-4	Topp...B	30-45	3500	4	Wauk.	4-4½x6½	Gas.	3-4	
Bates Mule. F	18-25	...	2	Midw.	4-4½x6½	Gas.	3	Lauson Road...	15-30	2225	4	Beav.	4-4½x6	K	3	Toro Cultivator	6-10	...	3	LeR.	4-3½x4½	Gas.	2	
Bates Mule, G	25-35	...	2	Midw.	4-4½x6	Gas.	com.	Leader...B	12-18	1995	4	Own	2-6 x6½	G,K,D	2-3	Townsend...	10-20	895	2	Own	4-6½x7	Ker.	2-3	
Beeman...G	2-4	315	4	Own	1-3½x4½	Gas.	...	Leader...N	16-32	1985	4	Clim.	4-5 x6½	G,K	3-4	Townsend...	15-30	1485	2	Own	4-7 x8	Ker.	3-4	
Best...	30	3100	2	Own	4-4½x6½	G,K,D	8-9	Leader...GU	18-35	2775	2	Clim.	4-5 x6½	G,K	3-4	Townsend...	25-50	2750	2	Own	4-8½x10	Ker.	4-5	
Best...	60	5450	2	Own	4-6½x7	G,K,D	8-9	Leonard...E	20-30	2530	4	Buda	4-4½x6	G,K	3	TractionMotor	40-60	...	4	...	8-3½x5	Gas.	4-5	
Boring...1921	...	1850	3	Wauk.	4-4½x6½	Gor K	2	Lincoln...H	40-50	4500	4	Cont.	4-4½x6	G,K	4	Traylor...TB	6-12	715	4	LeR.	4-3½x4½	Gas.	1-2	
Burn-Oil, 1921	15-30	1650	4	Own	2-6½x7	Ker.	3-4	Linn...H	50	5100	4	Wauk.	4-5 x6½	Gas.	4	Triumph...H	18-36	2450	2	Erd.	4-4½x6	Ker.	4	
Capital...	15-30	1000	2	Own	4-4½x6	Gas.	3	Linn...W	60	5100	4	Wauk.	4-5 x6½	Gas.	4	Trundaar...10	25-40	3750	2	Wauk.	4-5 x6½	Gor K	4	
Case...	10-18	800	4	Own	4-3½x5	Gor K	2	Little Giant, B	16-22	2200	4	Own	4-4½x5	K	4	Turner...1921	14-25	1295	4	Buda	4-4½x6	G,K	3	
Case...	15-27	1680	4	Own	4-4½x6	Gor K	3	Little Giant, A	26-35	3300	4	Own	4-5½x6	K	6	Twin City...	12-20	1580	4	Own	4-4½x6	G,K	3	
Case...	22-40	3100	4	Own	4-5½x6½	Gor K	4-5	Lombard...1921	85-150	...	2	...	6-5½x6½	Gas.	16	Twin City...	20-35	3175	4	Own	4-5½x6½	G,K	5	
Caterpillar T11	25	3975	2	Own	4-4½x6	Gas.	4	Lombard...1921	50	...	2	...	4-4½x6½	...	6-10	Twin City...	40-65	5250	4	Own	4-7½x9	G,K	8	
Caterpillar T16	40	6050	2	Own	4-6½x7	Gas.	6	Magnet...B	14-28	1875	4	Wauk.	4-4½x6½	K&G	3	Uncle Sam C20	12-20	1385	4	Weid.	4-4 x5½	G	2-3	
Centaur...	5-2½	385	2	N Way	2-4½x5½	Gor K	1	Master Jr...	5-10	585	...	LeR.	2-5½x4	Gas.	1	Uncle Sam B19	20-30	2300	4	Beav.	4-4½x6	Gor K	3-4	
Chase...	12-25	1725	3	Buda	4-4½x6½	Gor K	2-3	MerryGar1921	2	230	2	Evin	1-2½x2½	Gas.	...	Uncle Sam D21	20-30	1985	4	Beav.	4-4½x6	Gor K	3-4	
Chicago...40	40	2500	4	Own	4-4½x6	Gas.	4	Minne...All-P	12-25	900	4	Own	4-4½x7	Gor K	3-4	Universal...	1-4	475	2	Own	1-3½x5	G	1	
Cletrac...F	9-16	845	2	Own	4-3½x4½	G,K,D	2	Minne...Gen-P	17-30	1675	4	Own	4-4½x7	Gor K	3-4	Victor...501	2½-4	380	4	Own	1-3½x5½	Gas.	2	
Cletrac...W	12-20	1495	2	Own	4-4 x5½	G,K,D	2-3	Minne...	22-44	3000	4	Own	4-6 x7	Gor K	5-6	Victory...1921	9-18	1350	4	Gray	4-3½x5	Gas.	2	
Dakota...	15-27	1500	3	Dom.	4-4½x6	Gas.	3	Med.Duty	22-44	3000	4	Own	4-6 x7	Gor K	5-6	Victory...1921	15-30	1750	4	Wauk.	4-4½x5½	Gas.	3	
Dart...B.J.	4	1530	1800	4	Buda	4-4½x6	Gas.	3-4	Minne...	35-70	4150	4	Own	4-7½x9	Gor K	8-9	Vim...B	15-30	1650	4	Wauk.	4-4½x5½	G,K	3
Depue...	20-30	2500	4	Buda	4-4½x6	Gas.	4	HeavyDuty	35-70	4150	4	Own	4-7½x9	Gor K	8-9	Wallis...N	15-30	1650	4	Wauk.	4-4½x5½	G,K	3	
Dill...	20	2380	4	Cont.	4-4½x5½	Gas.	3	Mohawk 1921	8-16	785	2	Light	4-3½x4½	Kor G	1-2	Waterloo...K	12-25	1450	4	Own	2-6½x7	G,K	3	
Dill...R.W.	20	2980	4	Midw.	4-4½x6	Gas.	3	Moline Univ D	9-18	990	2	Own	4-3½x5	Gas.	2-3	Webfoot...53	28-53	5000	2	Erd.	4-6½x7	G,D	6	
Do-It-All..A	3-6	595	...	Own	1-4½x5	Gas.	1	Moline Orch...	9-18	1075	2	Own	4-3½x5	Gas.	2-3	Wellington. B	12-22	...	4	Wisc.	4-4 x6	Ker.	2-3	
Eagle...	12-22	...	4	Own	2-7 x8	Gor K	3-4	Motoculc...	1½	195	2	Own	1-2½x3½	Gas.	...	Wellington. F	16-30	...	4	Chief	4-4½x6	Ker.	3-4	
Eagle...F	16-30	...	4	Own	2-8 x8	Gor K	4-5	Motoc...	15-30	2250	4	Buda	4-4½x6	Gas.	3-4	Western, 1920	16-32	2100	4	Clim.	4-5 x6½	Gas.	4	
E-B...AA	12-20	1445	4	Own	4-4½x5	G,K,D	3	NB...1	3-6	425	4	Own	2-3½x4	Gas.	1	Wharton21-22	12-25	1585	4	Wauk.	4-4 x5½	G,K	3	
E-B...Q	12-20	925	4	Own	4-4½x5	G,K,D	3	Nichols-Shap...	20-42	3100	4	Own	8 x10	Gor K	3-6	Wharton-W.E	12-20	1800	3	Buda	4-4½x5½	Gas.	2	
Evans...	18-30	2080	4	Own	4-4½x5	G,K,D	3	Nichols-Shap...	20-42	3100	4	Own	8 x10	Gor K	3-6	Whitney...T	9-18	595	4	Own	2-5½x6½	Gas.	2	
Fagenol...D	9-12	1525	4	Lye.	4-3½x5	Gas.	2	Nichols-Shap...	25-50	3440	4	Own	9 x12	Gor K	4-7	Wichita...B	15-30	2000	4	Beav.	4-4½x6	G,K,D	3-4	
Farm Horse. B	18-30	1885	4	Clim.	4-5 x6½	G,K	3-4	Nilson Senior...	25-50	2475	5	Wauk.	4-5 x6½	G,K	4	Wisconsin...E	16-40	2250	4	Clim.	4-5 x6½	Gor K	3	
Farquhar...	15-25	...	4	Buda	4-4½x6	G,K,D	3-4	Oil Pull...K	12-20	1485	4	Own	2-6 x8	K,D	3	Wisconsin...F	20-40	2450	4	Wauk.	4-5½x7	Gor K	4	
Farquhar...	18-35	...	4	Own	4-6 x8	G,K,D	4-5	Oil Pull...H	16-30	2285	4	Own	2-7 x8½	K,D	4	Wisconsin...H	22-40	3200	4	Clim.	4-5½x7	Gor K	4-6	
Farquhar...	25-50	...	4	Own	4-7 x8	G,K,D	6-7	Oil Pull...G	20-40	3175	4	Own	2-8 x10	K,D	5-6	Yuba...12-20	12-20	2600	2	Wisc.	4-4½x6½	G,K,D	3	
Fitch...4	20-35	...	4	Clim.	4-5 x6½	Gor K	3-4	Oil Pull...E	30-60	4590	4	Own	2-10x12	K,D	8-10	Yuba...15-25	15-25	3100	2	Wisc.	4-4½x6	G,K,D	...	
Flour City	20-35	...	4	Own	4-5½x6	Ker.	4-6	Oldsmar Gark	2½-5	395	4	Own	1-5½x5½	Gas.	1	Yuba...23-35	20-35	4185	2	Wisc.	4-5½x7	G,K,D	4	
Flour City	30-50	...																						

# COMING MOTOR EVENTS

## AUTOMOBILE SHOWS

Cincinnati	Automotive Equipment Exposition	Nov. 26-Dec. 3
New York	Automobile Salon	Nov. 27-Dec. 3
London, Ontario	National Motor Show of Western Canada	January
New York	National Automobile Show	Jan. 7-13
Buffalo	Buffalo Automobile Dealers' Assn.	Jan. 14-21
Philadelphia	Automobile Show	Jan. 14-22
Tulsa, Okla.	Automobile Show	Jan. 16-21
Oakland, Calif.	Automobile Show	Jan. 16-22
Milwaukee	Fourteenth Annual Automobile Show	Jan. 19-25
Cleveland	Cleveland Automobile Mfrs. and Dealers' Assn.	Jan. 21-28
Baltimore	Annual Automobile Show	Jan. 21-28
Portland, Ore.	Annual Automobile Show	Jan. 23-29
Chicago	National Automobile Show	Jan. 28-Feb. 3
Chicago	Automobile Salon	Jan. 28-Feb. 3
Minneapolis	Tractor Show	Feb. 6-11
Minneapolis	Automobile Show	Feb. 6-11
Winnipeg, Canada	Canadian Automotive Equipment Assn. Show	Feb. 6-11
Kansas City	Kansas City Motor Dealers' Assn.	Feb. 9-16
Atlanta	Southern Automobile Show	Feb. 11-18
San Francisco	Sixth Annual Pacific Automobile Show	Feb. 11-18
Louisville, Ky.	Fourteenth Annual Automobile Show	Feb. 20-25
Syracuse	Fourteenth Annual Automobile Show	Feb. 20-25
Des Moines	Winter Automobile Show	Feb. 26-March 3
Springfield, Mass.	Seventh Annual Automobile Show	Feb. 27-March 4
Brooklyn	Eleventh Annual Show	March 4-11
Boston	Annual Automobile Show	March 11-18
Newark, N. J.	Newark Automobile Dealers' Assn.	March 11-18

## FOREIGN SHOWS

Shanghai, China	Automobile Show	Nov. 26-Dec. 3
Calcutta, India	Automobile Show	Dec. 19-24
Santiago, Cuba	Annual Automobile Show	March, 1922
Rio de Janeiro, Brazil	Automotive Exhibition	September, 1922

## CONVENTIONS

Columbus, O.	Ohio Automotive Trade Assn. Meeting	Dec. 12-14
Chicago	American Road Builders' Convention and Show	Jan. 17-23
Chicago	Fifth Annual N. A. D. A. Convention	Jan. 30-31

## Grand Prix Race Booked to Be Run in Paris in 1922

Paris, Nov. 20—The artisocratic Bois de Boulogne, one of the big parks on the western edge of the city of Paris, is proposed as the scene of the French Grand Prix automobile race to be held next summer. The original suggestion was to run the automobile race around the outside of Longchamp race course, inside the Bois de Boulogne. There is a good wide road around the course, the distance being nearly two miles, and it is believed this could be made into an excellent speedway with a little alteration.

Racing experts are not very enthusiastic about the course around Longchamp, for it is considered to be too short and to be rather dangerous owing to the turns. It would not be a difficult matter, however, to use these roads in conjunction with others in the Bois de Boulogne, thus getting a course from four to six miles in length. Permission for the use of these roads for racing purposes will have to be obtained from the Paris municipal council and the government. An automobile race in the city of

Paris would unite at least half a million spectators, and as the city and the state would profit by the taxes levied on this event there is a strong argument in favor of granting the use of the roads. A precedent was established a few weeks ago when the Allee des Acacias, running through the heart of the Bois de Boulogne, was allowed to be used for the first time in history for motorcycle speed records.

If the Bois de Boulogne can be obtained, the Grand Prix race will be held about the middle of June, just after the Grand Prix horse race at Longchamp. At this time of the year the Paris season is at its height and the maximum number of spectators can be counted on.

## GRAHAM RESOLUTION STIRRING

Washington, Nov. 29—Every effort is being made to expedite the passage of the so-called Graham resolution, which would impose a tax of 90 per cent on automobiles, trucks and other war supplies reimported to this country. The bill is on the senate calendar and will be considered after the conference report on internal revenue revision is adopted.

## COTTA SALE SET FOR DEC. 15

Rockford, Ill., Nov. 28—Court order for sale of the Cotta Transmission Co., adjudged bankrupt last spring but since operated by trustees to put it on the market as a "going concern," has been issued by Frank Wean, referee in bankruptcy. The date of the sale is Dec. 15, and effort is being made by Rockford financiers to raise funds sufficient to buy the plant and prevent its removal to another city or its operation by other than local capital.

Three plans for disposal of the trusteeship were submitted and 31 creditors representing claims of \$233,042 voted in favor of its continued operation until its sale as a "going concern." Suggestion of indefinite continuance of the plant as under the trustees was approved by 23 creditors with claims aggregating \$165,440. If bids received Dec. 15 are inadequate, it is likely the company will continue to operate as in the past.

## ARMATURES WHILE YOU WAIT

Chicago, Nov. 28—New ideas are being injected into the armature rewinding business by the U. S. Auto Supply Co. This company, some time ago, established a system whereby each armature received was immediately replaced with one that was ready for use, rather than having the customer wait until his armature could be rewound or otherwise repaired. This plan was so successful that the company recently announced a plan whereby customers could send to them all armatures awaiting repairs, these to be placed in condition and held by the company until they are required by the customer. Armatures will be shipped from this stock on order and the charge for repairing made at the time of shipment.

## DORT ADDS COMMERCIAL CAR

Flint, Mich., Nov. 29—The Dort Motor Car Co. has added a commercial car to its line, to be placed on the passenger car chassis with heavier springs.

The new model is built to carry 1000 pounds, and is offered as a chassis with lamps, lamp brackets, front fenders, runningboards, radiator, hood, windshield, seat frame, cowl board and body to rear of front seat at \$685; with driver's cab and curtains added, \$715; curtains and all-steel express body, \$750; and with cab, curtains, express body and canopy top for \$825, all f. o. b. factory.

## DEALERS, SALESMEN CONFER

Philadelphia, Nov. 29—Two hundred out-of-town Willys-Overland dealers and salesmen, representing eastern Pennsylvania, southern New Jersey, Delaware, Maryland, Virginia, West Virginia, eastern Tennessee and northern North Carolina took part with Philadelphia salesmen and other employees of the Willys-Overland, Inc., of Philadelphia, in a series of "Tom Jones" get-together meetings, Nov. 7 and 8, and listened to optimistic addresses on business.